Fishery Data Series No. 08-66

Goodnews River Salmon Monitoring and Assessment, 2007

Annual Report for Project FIS 07-305
USFWS Office of Subsistence Management
Fisheries Information Services Division

by

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and

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Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye to fork	MEF
mideye to tail fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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ABSTRACT

Salmon returning to the Goodnews River support subsistence, commercial, and sport fisheries near the community of Goodnews Bay in Southwest Alaska. The Goodnews River is the primary salmon spawning drainage in the area and provides an important subsistence fishery resource for residents from the communities of Goodnews Bay and Platinum. The Alaska Department of Fish and Game (ADF&G), in cooperation with the U.S. Fish and Wildlife Service (USFWS), operates a resistance board weir to enumerate 5 species of Pacific salmon and Dolly Varden *Salvelinus malma* returning to the Middle Fork Goodnews River. In 2007, a total of 3,852 Chinook salmon *Oncorhynchus tshawytscha*, 72,282 sockeye salmon *O. nerka*, 49,285 chum salmon *O. keta*, 4,819 pink salmon *O. gorbuscha*, 20,767 coho salmon *O. kisutch*, and 1,549 Dolly Varden were estimated to have passed through the weir from 25 June through 18 September. Chinook and sockeye salmon sustainable escapement goals were either met or exceeded in 2007. Escapements for Chinook, sockeye, and chum salmon were above average; however, coho salmon escapement was below average. A live trap was used to collect samples from Chinook, sockeye, chum, and coho salmon to estimate the age, sex, and length composition of each population. The Chinook salmon run was comprised of 63.9% males and the dominate age class was age-1.4 (34.8%). The sockeye salmon run was comprised of 49.9% male and the dominate age class was age-1.3 (70.0%). The chum salmon run was comprised of 48.6% male and the dominate age class was age-0.3 (54.1%). The coho salmon run was comprised of 47.6% male and the dominate age class was age-2.1 (83.1%). Aerial surveys in the Goodnews River drainage were not possible in 2007. Chinook and sockeye salmon drainage-wide run abundance was estimated based on the recent 10 year average aerial survey proportions between Middle Fork and North Fork aerial survey estimates.

Key words: Goodnews River, Kuskokwim Area, Kuskokwim Bay, Chinook *Oncorhynchus tshawytscha*, chum *O. keta*, coho *O. kisutch*, sockeye *O. nerka,* pink salmon *O. gorbuscha*, Dolly Varden *Salvelinus malma,* escapement monitoring, resistance board weir.

INTRODUCTION

Salmon returning to the Goodnews River support subsistence, commercial, and sport fisheries each summer near the community of Goodnews Bay in Southwest Alaska. The Alaska Department of Fish and Game (ADF&G), in cooperation with the U.S. Fish and Wildlife Service (USFWS), operates a resistance board weir to enumerate returning adult salmon, by species, on the Middle Fork Goodnews River (Middle Fork) in an effort to ensure future sustainability of this resource.

The Goodnews River watershed drains an area of nearly 1,000 mi^2 (2,589.9 km^2) along the west side of the Togiak National Wildlife Refuge (Figure 1). It flows a distance of 60 river miles (96.6 river kilometers) along its main stem, from the Ahklun Mountains southwest into Goodnews Bay. Two major tributaries, the Middle Fork and South Fork Goodnews rivers, join the main stem a few miles from its mouth and are included within its drainage. In order to differentiate between them, the Goodnews River refers to all 3 drainages, and the main stem Goodnews River upstream of its confluence with the Middle Fork will be referred to as the North Fork Goodnews River or North Fork.

SALMON FISHERIES

The Goodnews River is the primary salmon spawning drainage in the area and provides a vital subsistence fishery resource for residents from the communities of Goodnews Bay and Platinum. Subsistence fishing is allowed throughout the Goodnews River drainage and in Goodnews Bay. Fish are primarily harvested with drift and set gillnets. ADF&G has quantified subsistence salmon harvests in the communities of Goodnews Bay and Platinum since 1977. Harvest estimates are determined from interviews with subsistence fishers in October and November (Whitmore et al. 2008). Sockeye salmon *Oncorhynchus nerka* are the most utilized subsistence

salmon species in the Goodnews Bay area over the past 10 years followed by Chinook salmon *O. tshawytscha*, coho salmon *O. kisutch*, and chum salmon *O. keta* (Appendix A1).

Commercial salmon fishing occurs in Goodnews Bay within the boundaries of District W-5 (Figure 2). Commercial fishing has occurred annually in District W-5 since it was established in 1968. This is the southernmost district in the Kuskokwim Area, which includes districts in Kuskokwim Bay and the Kuskokwim River. Permit holders have unrestricted movement between commercial fishing districts within the Kuskokwim Area and fishers from distant communities often participate in the District W-5 commercial fishery. In 2004, the Alaska Board of Fisheries (BOF) moved the District W-5 western boundary from a line between the northernmost tip of the north spit and the southernmost tip of the south spit to a line between regulatory markers placed outside Goodnews Bay approximately 2 miles along the edge of the north and south spit (Figure 2).

The commercial fishery is primarily directed toward harvesting sockeye and coho salmon and is conducted from skiffs using hand-pulled gillnets. Pink salmon *O. gorbuscha* are the least valuable species commercially and have not been targeted in recent years. ADF&G has collected harvest data from fish buyers and processors since the district was created.

Sport fishing occurs throughout the Goodnews River drainage. Pacific salmon, rainbow trout *O. mykiss*, Dolly Varden *Salvelinus malma*, Arctic char *Salvelinus alpinus*, and Arctic grayling *Thymallus arcticus* are targeted. Many sport fishers take commercially guided or unguided float trips from lakes in the headwaters to the mouth at Goodnews Bay. There is currently one commercially operated lodge with a semi-permanent camp in the drainage that offers fishing from powered skiffs. ADF&G has been estimating sport fish harvests consistently since 1991.

PROJECT HISTORY

ADF&G Division of Commercial Fisheries has operated a salmon escapement monitoring project on the Middle Fork Goodnews River since 1981 (Appendix B1). The project was initiated as a counting tower in 1981 and was operated through 1990 (Burkey 1989, 1990; Schultz 1982, 1984a, b, 1985, 1987; Schultz and Burkey 1989) targeting counts of Chinook, sockeye, and chum salmon. Although successful, the tower was limited by problems with species identification and high labor costs (Menard 1999). In 1991, resources were redirected towards a fixed-picket weir addressed these problems. The fixed-picket weir was operated from 1991 through mid season of 1997, approximately 250 yd (229 m) downstream from the former tower site. Species identification improved with the weir, as the observer was now just a few feet from fish passing upstream and labor costs were reduced. Fish passage could be controlled, eliminating the need for hourly monitoring and increasing the efficiency of live fish capture to collect ASL information. Personnel were reduced from 3 crew members to 2. Flood events were problematic if the weir could not be removed early in the season. The weir would rapidly collect debris, damming the flow until it failed and washed downstream, which occurred several times during the early 1990s.

In the mid 1990s, ADF&G began cooperating with the USFWS Togiak National Wildlife Refuge to build a resistance board weir and extend the project's operational period to include coho salmon run in August and September. In July 1997, the fixed-picket weir was replaced with a resistance board weir designed to shed debris loads by sinking under high water conditions and has allowed the project to remain operational at higher water levels compared to the fixed-picket weir. The resistance board weir design can be rendered inoperable during extreme high water

events; however, the design can remain operational at higher water levels and can regain operations quicker once high water events subside.

Extended operation of the weir has also allowed biologists to monitor the migration of smaller Dolly Varden, believed to be a pre-spawning population overwintering in the drainage (Lisac 2003). Dolly Varden contribute to the overall subsistence harvest of the residents of the Goodnews Bay area (Wolfe et al. 1984). However, information about their life history and abundance is limited.

ESCAPEMENT MONITORING AND ESCAPEMENT GOALS

The Middle Fork Goodnews River weir serves primarily as a management tool for the commercial and subsistence salmon fisheries in the Goodnews Bay area, but also generates data relevant to the Goodnews River drainage as a whole. These data are used to make inseason management decisions, estimate drainage wide escapement, and develop both Sustainable Escapement Goals (SEG) and Biological Escapement Goals (BEG). The project also serves as a platform for other studies in the drainage, such as collecting samples for genetic stock identification and tagging Dolly Varden to study run timing and seasonal distribution (Lisac 2007, *In prep*).

Salmon escapement objectives for the Middle Fork counting tower were initially established in 1984 as ranges set at 3,000–4,000 Chinook, 35,000–45,000 sockeye, and 13,000–18,000 chum salmon (Schultz 1984b). An escapement objective was not established for coho salmon as the project typically ceased operation in mid August, which is well before the coho run ends. In 1989, the escapement objective range for sockeye salmon was reduced to 20,000–30,000 fish (Burkey 1990). An evaluation of the sockeye salmon exploitation rate in previous years indicated that historical harvest levels could be maintained with a reduced escapement objective. These ranges remained in place when the counting tower was replaced with the fixed-picket weir in 1991.

In 1992, weir based SEGs were first established for Chinook, sockeye, and chum salmon (Buklis 1993). The respective SEGs were set as the midpoints of tower escapement objective ranges: 3,500 Chinook, 25,000 sockeye, and 15,000 chum salmon. In 2004, evaluation of Arctic-Yukon-Kuskokwim (AYK) Region escapement goals resulted in establishment of revised SEGs for the Middle Fork Goodnews River weir (ADF&G 2004). The revised goals, described as ranges or thresholds, were 2,000–4,500 Chinook salmon, 23,000–58,000 sockeye salmon, and greater than 12,000 chum salmon. An SEG threshold was also established for coho salmon at greater than 12,000. In 2007, evaluation of Arctic-Yukon-Kuskokwim (AYK) Region escapement goals resulted in a revision of the Middle Fork Goodnews River weir Chinook and sockeye salmon escapement goals from SEGs to BEGs (Brannian et al. 2006). Ricker two parameter spawner-recruit models were used to estimate the escapement that produces maximum sustained yield (MSY) (Tables 1 and 2; Molyneaux and Brannian 2006). The current BEG for Chinook salmon is set at 1,500–2,900 fish and the current BEG for sockeye salmon is set at 18,000–40,000 fish.

Goodnews River drainage salmon escapements have also been monitored by aerial survey since 1962 (Appendix C1). Aerial survey escapement assessment can be subject to variability depending on conditions and observers; however, when observers, timing, and methods are standardized, to the extent feasible and survey conditions meet acceptable criteria, the resulting counts represent an index of escapement. Procedures established in recent years have increased

the annual consistency of Goodnews River aerial surveys through the creation of an aerial survey location database, intensive preflight planning, and establishment of dedicated aerial survey staff. Additionally, variability between observers and methods has been addressed through standardized training and consistency in observers, pilots, and aircraft used.

Aerial surveys are directed at indexing spawning populations of Chinook and sockeye salmon. Chum salmon have protracted run timing requiring multiple surveys throughout their run to ensure an adequate index of escapement. Chum surveys have been discontinued until methods can be improved or funding can be secured to allow for multiple aerial surveys. Additionally, Goodnews River coho salmon have been difficult to survey because of recurrent poor weather conditions. Coho salmon aerial surveys have been conducted when funding and weather conditions allow.

North Fork Goodnews River aerial survey escapement goals of 1,600 Chinook, 15,000 sockeye, 17,000 chum, and 15,000 coho salmon were initially established in 1992 (Buklis 1993). Middle Fork Goodnews River aerial survey escapement goals were established in 1992 at 800 Chinook, 5,000 sockeye, 4,000 chum, and 2,000 coho salmon. In 2004, evaluation of AYK Region escapement goals resulted in establishment of revised SEGs for Goodnews River aerial surveys (ADF&G 2004). The revised SEGs represent ranges, or thresholds, and were set at 640–3,300 Chinook and 5,500–19,500 sockeye salmon on the North Fork Goodnews River only. The North Fork chum and coho salmon aerial survey escapement goals set in 1992 were discontinued because of poor data quality. The aerial survey escapement goals set for the Middle Fork Goodnews River in 1992 were discontinued in deference to the revised SEGs set for the Middle Fork Goodnews River weir in 2004.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Salmon age, sex, and length (ASL) information has been collected from escapement projects in the Middle Fork Goodnews River since 1984 and from District W-5 commercial harvest since 1985. Annual ASL composition estimates of escapement are used to develop stock-recruitment models, in turn providing information used for projecting future run sizes. Historical summaries of existing ASL information for salmon returning to the Goodnews River drainage can be found in Molyneaux et al. (2006).

SITE DESCRIPTION

The Middle Fork parallels the North Fork and flows a distance of approximately 45 river miles (72.4 river kilometers) before joining the main stem. The weir project is located approximately 10 river miles (16.1 river kilometers) from the village of Goodnews Bay on the Middle Fork (59° 09.595’ N 161° 23.287’ W; Figure 1). The channel at the weir location is 200 ft (61.0 m) wide, has a regular profile from 1 to 4 ft deep, which tapers to low cut banks on either side with low flow during average water conditions. The river substrate is primarily cobblestone, gravel, and sand. The upstream half of the channel is characterized by deep water along a steep cut bank approximately 20 ft (6.1 m) in height on the left bank (as looking downstream) tapering to a gravel bar on the right bank. The project camp site is located on the left bank approximately 50 yd (45.7 m) upstream and 30 yd (27.4 m) inland from the weir location. Weir materials are stored over the winter on the left and right banks, approximately 30 yd (27.4 m) inland and parallel to the weir location.

OBJECTIVES

The annual objectives for the Middle Fork Goodnews River weir project are to:

1. Estimate Chinook, sockeye, chum, and coho salmon escapement in Middle Fork Goodnews River.
2. Estimate run timing of Chinook, sockeye, chum, and coho salmon and Dolly Varden to the Middle Fork Goodnews River.
3. Estimate escapement of Chinook, sockeye, chum, and coho salmon to Goodnews River drainage.
4. Estimate Chinook, sockeye, chum, and coho salmon ASL composition of Middle Fork Goodnews River escapement.
5. Estimate Chinook, sockeye, chum, and coho salmon ASL composition in the District W-5 commercial fishery.
6. Estimate Dolly Varden passage at the Middle Fork Goodnews River weir.
7. Collect genetic samples of salmon stocks at the Middle Fork Goodnews weir.
8. Record atmospheric and hydrologic conditions at the weir site.

METHODS

RESISTANCE BOARD WEIR

Methods for the design, construction, and installation of the resistance board weir followed Stewart (2002, 2003), and Tobin (1994). The approximately 200 ft (60.9 m) weir used at the Middle Fork Goodnews River site was comprised of 2 principle components: the substrate rail and the resistance board panel sections. Picket spacing of the weir panels allowed for a complete census of all but the smallest returning Chinook, sockeye, chum, and coho salmon. The picket interval of the Middle Fork Goodnews River weir was 2.6 inches, which left a gap of 1.3 inches between pickets. The picket spacing allowed smaller fish, such as pink salmon and other non salmon species, to pass upstream and downstream through the weir. Further details of resistance board weir components used for the Goodnews River weir are described in Stewart (2004).

Two fish passage chutes were installed on the weir, one approximately 50 ft (15.2 m) from the left bank (as looking downstream), the other approximately 15 ft (4.57 m) from the left bank. A 10 ft (3 m) by 15 ft (4.6 m) live trap used to collect fish for ASL sampling was installed directly upstream of the passage chute located closest to the left bank. Gates were attached on both chutes to control fish passage.

Boats passed at a designated boat gate located in the center of the weir and boat operators were able to pass with little or no involvement by the weir crew. The boat gate consisted of boat passage panels described in Estensen and Diesigner (2004). Weight of a passing boat temporarily submerged the boat gate panels, allowing boats to pass over the weir. Boats with jet-drive engines were common and could pass upstream and downstream over the boat gate easily at reduced speed. Rafts could pass downstream by submerging the boat passage panels and drifting

over the weir. Boats with propeller-drive engines were uncommon and were towed upstream across the weir by crew members.

AERIAL SURVEYS

Aerial surveys were flown during peak spawning periods for each species in order to maximize the number of observable fish on the spawning grounds. Peak spawning periods were developed from run timing estimates and vary by species. Aerial surveys were numerically ranked on a scale of 1 = good, 2 = fair, and 3 = poor. Ranking criteria were based on survey method, weather and water conditions, time of survey, and spawning stage. Only surveys with rankings of fair and good (1 and 2) that were conducted within the peak spawning period were included as part of the Goodnews River aerial survey database.

Chinook and coho salmon aerial surveys were focused on the main river channel and larger tributaries while sockeye salmon aerial surveys were focused on the main river channel, larger tributaries and lakes, and larger lake tributaries. Aerial survey counts were tallied to derive a total count of observable fish in the North Fork and Middle Fork of the Goodnews River.

ESCAPEMENT MONITORING AND ESTIMATES

The target operational period for the Middle Fork Goodnews River weir in 2007 was 26 June through 18 September. To determine salmon escapement past the weir, fish passage counts were made daily during the operational period of the project. Passage counts occurred regularly throughout the day, typically for 1–2 h periods, beginning in the morning and continuing as late as light permitted. During counting periods the passage gate was opened to allow fish through the weir. Crew members identified and enumerated all fish by species as they exited the passage gate. Any fish observed traveling downstream through the fish passage gates were subtracted from the tally.

For various reasons, fish sometimes migrated downstream and required safe passage over the weir. This behavior was common among rainbow trout, Dolly Varden, and whitefish species *Coregonus spp.* The resistance board weir provided a means of accommodating downstream fish passage through incorporation of downstream passage chutes. Each chute consisted of a single panel set to allow some water to flow over the distal end of the panel. Further details of downstream passage chutes are described by Linderman et al. (2002). Fish do not typically pass upstream over these chutes and they are only set during periods of active downstream fish migration and were not enumerated. Downstream passage chutes were not used during periods of strong upstream salmon passage.

Salmon escapements were estimated for periods when a breach occurred in the weir. Estimates were assumed to be zero if passage was considered negligible based on historical data and run timing indicators. Breach event estimates were calculated as the average observed passage 2 days before and after the day a breach occurred multiplied by the hourly proportion of the breach duration in a 24 h day using the following formulas:

$$\widehat{n}_d = n_d \cdot \frac{t_b}{T_d} \tag{1}$$

and

$$n_d = \left(\frac{\left(\overline{n}_{d-1 \to d-2}\right) + \left(\overline{n}_{d+1 \to d+2}\right)}{2} \right) \quad (2)$$

where:

$\hat{n}_d$ = passage estimate for the day a weir breach occurred,

n_d = average passage from the 2 days before and after the day a weir breach occurred,

t_b = time period (in hours) the weir was breached,

T_d = number of hours in a day (24),

$\overline{n}_{d-1 \to d-2}$ = average passage from 2 days before the day a weir breach occurred, and

$\overline{n}_{d+1 \to d+2}$ = average passage from 2 days after the day a weir breach occurred.

Daily estimated salmon passage then became the sum of any observed passage from the day the weir breach occurred and the breach estimate.

Weir escapement was also estimated for periods when the weir was not operational but within the targeted operational dates. Estimates were calculated based on the proportional relationship between observed weir counts at the Middle Fork Goodnews River weir and weir counts from a model data set. The model data set could be from a different year at Goodnews River or from the same year at a neighboring weir project. The model data set was selected based on the strongest (Pearson) correlation between observed passage during the operational period at Middle Fork Goodnews River weir and observed passage from a model data set during the same time period. Daily passage estimates were the result of daily passage proportions of the model data set relative to the observed weir counts minus any observed passage from the day being estimated, and were calculated using the formula:

$$\breve{n}_d = \frac{\left(n_{d_c} \times \left(\sum_{d_z}^{d_a} y_e\right)\right)}{\left(\left(\sum_{d_z}^{d_a} y_c\right) - n_{d_e}\right)} \quad (3)$$

where:

$\breve{n}_d$ = passage estimate for the day weir was not operational,

n_{d_c} = the number of fish per species that passed the weir on that day from the model data set,

$\sum_{d_z}^{d_a} y_e$ = the sum of all daily counts per species for the year being estimated,

$\sum_{d_z}^{d_a} y_c$ = the corresponding sum of all daily counts per species from the model data set, and

n_{d_e} = the number of fish per species that passed the weir on that day for the year being estimated.

To estimate Chinook and sockeye salmon Goodnews River drainage escapement, North Fork Chinook and sockeye salmon escapement was calculated by applying the 10 year average proportion of fish observed between the Middle Fork and North Fork aerial surveys to the weir escapement. Drainage escapement estimates for Chinook and sockeye salmon were calculated using the following formula:

$$N_d = \left(\left[\frac{n_{a_{nf}}}{n_{a_{mf}}} \right] n_{w_2} \right) + n_{w_2} \quad (4)$$

where:

N_d = total drainage escapement estimate,

$n_{a_{nf}}$ = recent 10 year average aerial survey count from the North Fork Goodnews River,

$n_{a_{mf}}$ = recent 10 year average aerial survey count from the Middle Fork Goodnews River,

and

n_{w_2} = final weir escapement count including any estimates.

AGE, SEX, AND LENGTH ESCAPEMENT SAMPLING

Escapement sampling for Chinook, sockeye, and chum salmon ASL composition estimates was conducted based on the pulse sampling design of Molyneaux et al. (2006). Each pulse consisted of intensive sampling for 1 to 3 day intervals followed by a few days without sampling. The goal for each pulse was to collect samples from 210 Chinook, 210 sockeye, 200 chum, and 170 coho salmon. These sample sizes were selected for simultaneous 95% confidence interval estimates of age composition ± 0.1 and were adjusted from sample sizes recommended by Bromaghin (1993) to account for regenerated and otherwise unreadable scales. The minimum number of pulse samples was one per species from each third of the run.

Salmon were sampled from a fish trap installed in the weir. The general practice was to open the entrance gate and leave the exit gate closed allowing fish to accumulate inside the holding pen. The holding pen was typically allowed to fill with fish and sampling was done during scheduled counting periods.

Scales were removed from the preferred area of the fish (INPFC 1963). Sex was determined by visually examining external morphology, keying on the development of the kype, roundness of the belly, and the presence or absence of an ovipositor. Length was measured to the nearest millimeter from mideye to tail fork. After each fish was sampled, it was released into a recovery area upstream of the weir. After sampling was completed, relevant information such as sex, length, date, and location was copied from hardcopy forms to computer mark–sense forms. The completed gum cards and data forms were sent to the Bethel and Anchorage ADF&G offices for processing. Further details of sampling procedures can be found in Molyneaux et al. (2006) and Stewart (2004).

AGE, SEX, AND LENGTH COMMERCIAL HARVEST SAMPLING

Commercial catch sampling for Chinook, sockeye, chum, and coho salmon ASL composition estimates was conducted based on the pulse sampling design of Molyneaux et al. (2006). Each pulse sample was taken from a single commercial period, which was determined based on the number of commercial periods that occurred in a given week. The primary goal was to characterize the ASL composition of the entire commercial harvest for each species. Pulse samples were collected from a minimum of 3 commercial openings per species, each representing a third of the total harvest per species. The goal for each pulse was to collect samples from 210 Chinook, 210 sockeye, 200 chum, and 170 coho salmon.

Salmon were sampled from the Quinhagak dock area where a tender from District W-5 unloaded the catch to the processor. ADF&G partnered with Coastal Villages Region Fund (CVRF) staff in 2007 to hire and train student interns in District W-4 and W-5 commercial ASL and genetics sample collection. This partnership was pursued in an effort to mitigate recurring logistical difficulties in achieving adequate commercial ASL samples. An area was set aside for the sampling crew and processor workers supplied the crew with totes of iced fish for sampling. Fish were sampled as efficiently and carefully as possible to reduce processing delays and prevent damaging fish quality. Sampled fish were returned to iced totes in an ongoing effort to preserve quality.

Scales were removed from the preferred area of the fish (INPFC 1963). Scales were taken from each fish and mounted on gum cards. All sampled fish were sex determined by visual inspection of internal gonads. Length was measured to the nearest millimeter from mideye to tail fork. The completed gum cards and data forms were returned to the Bethel ADF&G offices for data transfer to computer mark–sense forms and sample processing. Further details of sampling procedures can be found in Molyneaux et al. (2006).

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

ADF&G staff in Bethel and Anchorage aged scales, processed the ASL data, and generated data summaries (Molyneaux et al. 2006). These procedures generated 2 types of summary tables for each species; one described the age and sex composition and the other described length statistics. These summaries account for ASL composition changes over the season by first partitioning the season into temporal strata based on pulse sample dates, applying age and sex composition of individual pulse samples to the corresponding temporal strata, and finally summing the strata to generate the estimated age and sex composition for the season. This procedure ensured ASL composition estimates were weighted by fish abundance in the escapement or harvest rather than fish abundance in the samples. Likewise, estimated mean length composition was calculated by weighting sample mean lengths from each stratum by the escapement or harvest of salmon during that stratum. Similar procedures were used for coho salmon; however, sample design modifications implemented in 2004 and 2005 reduced the ability to estimate changes in ASL composition through the season in favor of estimating ASL composition for the entire run or harvest.

Ages were reported in tables using European notation. European notation is composed of 2 numerals separated by a decimal, where the first numeral indicates the number of winters spent by the juvenile fish in fresh water and the second numeral indicates the number of winters spent in the ocean (Groot and Margolis 1991). Total age is equal to the sum of these 2 numerals plus

one to account for the single winter of egg incubation in the gravel. For example, a Chinook salmon described as an age 1.4 fish under European notation has a total age of 6 years.

The original ASL gum cards, acetates, and mark–sense forms were archived at the ADF&G office in Anchorage. The computer files were archived by ADF&G in the Anchorage and Bethel offices.

ATMOSPHERIC AND HYDROLOGICAL MONITORING

Atmospheric and hydrological conditions were recorded around noon each day. Cloud cover was judged from clear to overcast; wind speed was recorded in miles per hour (mph) and direction was noted; precipitation was measured in mm per 24 hours. Daily high and low air and water temperatures were recorded in degrees Celsius. The river gauge height was recorded daily and was standardized to a benchmark established in 1997 representing a river stage of 150 cm. The benchmark is a 0.75 in diameter steel length of rebar driven into the bank along a steep grade downstream of the field camp. The river gauge is a steel rule installed near shore in the river and is set level with the top of the benchmark at 150 cm.

RESULTS

PROJECT OPERATIONS

The target operational period of 26 June to 18 September was not achieved in 2007 as the weir was operational from 25 June to 10 September. Holes in the weir caused by damage were discovered on 12, 27 July, and 13 August. Weir operations were also hampered from 5 through 7 August because the weir panel's resistance boards were un-set in response to rapidly rising water levels. A high water event beginning on 10 September rendered the weir inoperable through 18 September and the decision was made to discontinue operations for the remainder of the season. The weir crew began weir disassembly and camp closure once water levels receded to a workable level on 27 September.

WEIR ESCAPEMENT

The 2007 Middle Fork Goodnews River Chinook salmon escapement was estimated to be 3,852 fish during the target operational period (Table 3). A total of 3,736 Chinook salmon were observed passing upstream through the weir and 116 fish (≈3%) were estimated to have passed upstream during breach events and inoperable periods. Chinook salmon escapement exceeded the BEG range of 1,500–2,900 fish (Table 4). The first Chinook salmon was observed on 25 June, the first day of operation, and the last Chinook salmon was observed on 3 September. Based on the target operational period and inclusive of estimated passage, the median passage date was 18 July and the central 50% of the run occurred between 11 July and 24 July (Table 5).

The 2007 Middle Fork Goodnews River sockeye salmon escapement was estimated to be 72,282 fish during the target operational period (Table 3). A total of 71,437 sockeye salmon were observed passing upstream through the weir and 845 fish (≈1%) were estimated to have passed upstream during breach events and inoperable periods. Sockeye salmon escapement exceeded the upper end of the BEG range of 18,000–40,000 fish (Table 4). The first sockeye salmon was observed on 25 June, the first day of operation, and the last sockeye salmon was observed on 10 September, the last day of operation. Based on the target operational period and inclusive of

estimated passage, the median passage date was 8 July and the central 50% of the run occurred between 2 July and 16 July (Table 5).

The 2007 Middle Fork Goodnews River chum salmon escapement was estimated to be 49,285 fish during the target operational period (Table 3). A total of 48,973 chum salmon were observed passing upstream through the weir and 312 fish (<1%) were estimated to have passed upstream during breach events and inoperable periods. Chum salmon escapement exceeded the SEG threshold of 12,000 fish (Table 4). The first chum salmon was observed on 25 June, the first day of operation, and the last chum salmon was observed on 9 September. Based on the target operational period and inclusive of estimated passage, the median passage date was 23 July and the central 50% of the run occurred between 9 July and 31 July (Table 5).

The 2007 Middle Fork Goodnews River coho salmon escapement was estimated to be 20,767 fish (Table 3). A total of 16,416 coho salmon were observed passing upstream through the weir and 4,351 fish (≈21%) were estimated to have passed upstream during breach events and inoperable periods. Coho salmon escapement exceeded the SEG threshold of 12,000 fish (Table 4). The first coho salmon was observed on 27 July and the last coho salmon was observed on 10 September, the last day of operation. Based on the target operational period and inclusive of estimated passage, the median passage date was 1 September and the central 50% of the run occurred between 24 August and 8 September (Table 5).

The 2007 Middle Fork Goodnews River total pink salmon count was 4,819 fish (Table 6). No escapement estimate is made for pink salmon because spacing between the weir panel pickets allows all but the largest pink salmon to pass through the weir unobserved and they are not a species targeted for escapement estimation. The first pink salmon was observed on 2 July and the last pink salmon was observed on 10 September, the last day of operation.

The 2007 Middle Fork Goodnews River total count of Dolly Varden was 1,549 fish (Table 6). Similar to pink salmon, no passage estimates were made for Dolly Varden because spacing between the weir panel pickets allows smaller Dolly Varden to pass through the weir unobserved. The first Dolly Varden was observed on 25 June, the first day of operation, and the last Dolly Varden was observed on 10 September, the last day of operation. The median passage date was 19 July and the central 50% of the run occurred between 11 July and 30 July (Table 5).

Whitefish and rainbow trout were also observed passing the weir in 2007 but were not enumerated. No passage estimates were made for whitefish and rainbow trout in 2007 because spacing between the weir panel pickets allows smaller fish of these species to freely pass through the weir unobserved.

AERIAL SURVEYS

Aerial surveys of the Goodnews River drainage were not conducted in 2007 because of poor weather and high water conditions during peak spawning periods.

DRAINAGE ESCAPEMENT

Goodnews River drainage escapement was estimated for Chinook and sockeye salmon in 2007. North Fork Chinook salmon escapement was estimated by applying the 10 year average proportion of aerial survey counts between the North Fork and the Middle Fork to weir escapement (Appendix D1). North Fork Chinook salmon escapement was estimated to be 5,618 fish and North Fork sockeye salmon escapement was estimated to be 63,782 fish (Table 4;

Appendix D1). Escapement to the Goodnews River drainage was estimated to be 9,469 Chinook salmon and 136,064 sockeye salmon (Table 4; Appendix D1).

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Middle Fork Goodnews River Escapement

Scale samples, sex, and length were collected from 272 Chinook salmon at the weir in 2007 (Table 7). Samples were collected from 4 pulses ranging in size from 58 to 87 fish per pulse. Although the samples did not achieve the minimum sample objectives, they were adequate for estimating ASL composition of weir escapement. Age was determined for 210 of the 272 fish sampled (77.2 %). Applied to aged samples, age-1.4 Chinook salmon were the most abundant age class (34.8%), followed by age-1.2 (33.7%), age-1.3 (27.2%), age-2.4 (1.6%), age-1.5 and age-1.1 (1.2%), and age-2.3 (0.3%) fish. Sex composition applied to aged samples was 62.9% males and 37.1% females. Mean male length of the samples by age class was 344 mm for age-1.1 fish, 533 mm for age-1.2 fish, 707 mm for age-1.3 fish, and 843 mm for age-1.4 fish (Table 8). Mean female length of the samples by age class was 776 mm for age-1.3 fish, 836 mm for age-1.4 fish, 847 for age-1.5, and 822 for age-2.4 fish. Overall, male sample lengths ranged from 328 to 975 mm and female sample lengths ranged from 667 to 980 mm.

Scale samples, sex, and length were collected from 1,041 sockeye salmon at the weir in 2007 (Table 9). Samples were collected from 6 pulses ranging in size from 41 to 253 fish per pulse. The samples achieved the minimum sample objectives and were adequate for estimating ASL composition of weir escapement. Age was determined for 727 of the 1,041 fish sampled (69.8%). Escapement was partitioned into 6 temporal strata based on sample dates. Applied to escapement, age-1.3 sockeye salmon were the most abundant age class (70.0%), followed by age-1.2 (12.2%), age-0.3 (8.1%), age-2.3 (4.2%), age-1.4 (3.0%), age-2.2 (1.6%), and age-0.4 (0.4%) fish. Sex composition applied to aged samples was 49.9% males and 50.1% females. Mean male length by age class was 564 mm for age-0.3 fish, 540 mm for age-1.2 fish, 576 for age-0.4, 576 mm for age-1.3 fish, 538 mm for age-2.2 fish, 589 mm for age-1.4 fish, and 569 mm for age-2.3 fish (Table 10). Mean female length by age class was 540 mm for age-0.3 fish, 511 mm for age-1.2 fish, 543 for age-0.4, 538 mm for age-1.3 fish, 467 mm for age-2.2 fish, 549 mm for age-1.4 fish, and 531 mm for age-2.3 fish. Overall, male lengths ranged from 455 to 680 mm and female lengths ranged from 453 to 601 mm.

Scale samples, sex, and length were collected from 1,002 chum salmon at the weir in 2007 (Table 11). Samples were collected from 6 pulses ranging in size from 69 to 210 fish per pulse. The samples achieved the minimum sample objectives and were adequate for estimating ASL composition of weir escapement. Age was determined for 865 of the 1,002 fish sampled (86.3 %). Escapement was partitioned into 6 temporal strata based on sample dates. Applied to escapement, age-0.3 chum salmon was the most abundant age class (54.1%), followed by age-0.4 (44.2%), age-0.5 (0.9%) and age-0.2 (0.8%) fish. Sex composition applied to aged samples was 53.9% males and 46.1% females. Mean male length by age class was 578 mm for age-0.3 fish, 595 mm for age-0.4, and 595 for age-0.5 fish (Table 12). Mean female length by age class was 536 mm for age-0.2 fish, 554 mm for age-0.3 fish, 556 mm for age-0.4 fish, and 551 for age-0.5 fish. Overall, male lengths ranged from 499 to 683 mm and female lengths ranged from 443 to 640 mm.

Scale samples, sex, and length were collected from 614 coho salmon at the weir in 2007 (Table 13). Samples were collected from 4 pulses ranging in size from 130 to 170 fish per pulse. The

samples achieved the minimum sample objectives and were adequate for estimating ASL composition of weir escapement. Age was determined for 463 of the 614 fish sampled (75.4 %). Escapement was partitioned into 4 temporal strata based on sample dates. Applied to escapement, age-2.1 coho salmon was the most abundant age class (83.1%), followed by age-1.1 (12.7%), and age-3.1 (4.3%) fish. Sex composition applied to aged samples was 47.6% males and 52.4% females. Mean male length of the samples by age class was 563 mm for age-1.1 fish, 578 mm for age-2.1 fish, and 551 mm for age-3.1 fish (Table 14). Mean female length of the samples by age class was 581 mm for age-1.1 fish, 591 mm for age-2.1 fish, and 591 mm for age-3.1 fish. Overall, male sample lengths ranged from 360 to 695 mm and female sample lengths ranged from 470 to 652 mm.

District W-5 Commercial Harvest

A total of 28 permit holders fished commercially in District W-5 for total harvests of 3,112 Chinook, 43,716 sockeye, 7,519 chum, and 13,689 coho salmon (Table 15). Scale samples, sex, and length were collected from 456 Chinook salmon harvested in the 2007 District W-5 commercial fishery (Table 16). Samples were collected from 4 pulses. The samples did not achieve the minimum sample objectives but were adequate for estimating ASL composition of District W-5 commercial harvest. Age was determined for 396 of the 456 fish sampled (86.8 %). Applied to aged samples, age-1.2 Chinook salmon were the most abundant age class (39.8%) followed by age-1.4 (35.0%), age-1.3 (21.9%), age-2.4 (2.3%), age-2.3 (0.6%), and age-1.5 (0.4%) fish. Sex composition applied to aged samples was 72.5% males and 27.5% females. Mean male length of the samples by age class was 547 mm for age-1.2 fish, 684 mm for age-1.3 fish, 830 mm for age-1.4, 721 mm for age-2.3, 865 mm for age-1.5, and 843 mm for age-2.4 fish (Table 17). Mean female length of the samples by age class was 571 mm for age-1.2 fish, 766 mm for age-1.3 fish, 836 mm for age-1.4, 1,042 mm for age 1.5, and 858 mm for age-2.4 fish. Overall, male sample lengths ranged from 450 to 1,015 mm and female sample lengths ranged from 557 to 1042 mm.

Scale samples, sex, and length were collected from 1,008 sockeye salmon harvested in the 2007 District W-5 commercial fishery (Table 18). Samples were collected from 6 pulses. The samples achieved the minimum sample objectives and were adequate for estimating ASL composition of District W-5 commercial harvest. Age was determined for 705 of the 1,008 fish sampled (69.9 %). Applied to aged samples, age-1.3 sockeye salmon were the most abundant age class (71.4%), followed by age-1.2 (10.0%), age-2.3 (8.7%), age-0.3 (4.2%), age-1.4 (3.6%), and age-2.2 (2.0%) fish. In addition to these fish there were 14 age-0.4 fish that accounted for less than 0.1% of the total. Sex composition applied to aged samples was 62.3% males and 37.7% females. Mean male length of the samples by age class was 564 mm for age-0.3, 514 mm for age-1.2 fish, 563 mm for age-1.3 fish, 524 mm for age-2.2, 571 mm for age-1.4 fish, and 574 mm for age-2.3 fish (Table 19). Mean female length of the samples by age class was 529 mm for age-0.3, 507 mm for age-1.2 fish, 530 mm for age-0.4, 538 mm for age-1.3 fish, 508 mm for age-2.2, 544 mm for age-1.4, and 545 mm for age-2.3 fish. Overall, male sample lengths ranged from 448 to 628 mm and female sample lengths ranged from 460 to 602 mm.

Scale samples, sex, and length were collected from 596 chum salmon harvested in the 2007 District W-5 commercial fishery (Table 20). Samples were collected from 4 pulses. The samples achieved the minimum sample objectives and were adequate for estimating ASL composition of District W-5 commercial harvest. Age was determined for 543 of the 596 fish sampled (91.1 %).

Applied to aged samples, age-0.3 chum salmon were the most abundant age class (52.5%) followed by age-0.4 (46.1%), age-0.5 (1.0%), and age-0.2 (0.4%) fish. Sex composition applied to aged samples was 55.7% males and 44.3% females. Mean male length of the samples by age class was 569 mm for age-0.3 fish, 581 mm for age-0.4, and 591 mm for age-0.5 fish (Table 21). Mean female length of the samples by age class was 536 mm for age-0.2, 541 mm for age-0.3 fish, 553 mm for age-0.4, and 580 mm for age-0.5 fish. Overall, male sample lengths ranged from 495 to 677 mm and female sample lengths ranged from 483 to 621 mm.

No scale samples, or sex and length data were collected from coho salmon harvested in the 2007 District W-5 commercial fishery because of logistical difficulties in gaining access to the commercial coho salmon harvest for sample collection.

ATMOSPHERIC AND HYDROLOGICAL MONITORING

Atmospheric and hydrological observations were recorded daily from 25 June through 18 September (Table 22). Air temperatures ranged from 1° to 17° C. Water temperature was more consistent ranging from 7° to 14° C. Several rain events resulted in daily accumulations from trace amounts up to 40.2 mm in a 24 h period. Water level ranged from 35 to 69 cm.

DISCUSSION

PROJECT OPERATIONS

Operation of the weir in 2007 was successful with a nearly complete census of Chinook, sockeye, chum, and coho salmon escapement, and Dolly Varden migration past the weir. The majority of project objectives were achieved with the exception of Chinook salmon escapement ASL estimates and coho salmon commercial ASL estimates. The project continues to add to the long-term escapement, run timing, and ASL database for salmon runs at the Goodnews River and serves as a platform for the study of other anadromous and resident freshwater species.

Average water levels through July and the first half of August contributed towards uninterrupted weir operations in 2007 and did not appear to hamper fish passage through the weir. However, in late August the Goodnews River drainage experienced heavy rain events which raised water levels and caused the premature termination of project operations on 10 September.

Achieving the Chinook salmon ASL sample objectives continues to be problematic. Low daily abundance, migration patterns, and behavior at the weir have made sample collection difficult. Minimum Chinook salmon sample objectives were not achieved; however, estimates were made based on the samples collected. Chinook salmon tend to migrate in large pulses so that their passage may be slow for a period of days and then suddenly peak. Coordinating ASL sampling to coincide with these pulses is difficult because timing of the pulses cannot be accurately predicted. An active sampling strategy of capturing Chinook salmon individually or in small groups as other species are allowed to pass freely through the trap has improved sample sizes, but the fish trap used at the weir does not present the best platform for active sampling. This strategy can work well, but is time intensive and Chinook salmon are often hesitant to approach the trap in its current fixed location and when there is increased activity around the trap. In an effort to achieve Chinook salmon sample objectives, active sampling will continue to be conducted at the weir and a new live trap was employed in 2007 to allow for increased sampling opportunity. Additionally, staff is currently evaluating revised sampling goals that would be

more proportional to the lower relative abundance of escapements seen at the Middle Fork Goodnews River weir. Analysis is ongoing and revised sampling goals are expected in the near future.

Achieving the District W-5 commercial ASL sample objectives has continued to prove problematic as well. Although the partnership between ADF&G and CVRF to collect commercial ASL samples in Quinhagak has met with overall success in achieving adequate commercial ASL sample goals from District 4, achieving sample goals for the District 5 commercial harvest remained difficult. The commercial catch is tendered from Goodnews Bay to Quinhagak and does not arrive until the day following each commercial opening. The tender's arrival at the Quinhagak dock is dependent upon tidal cycles at the mouth of the Kanektok River. Although the CVRF sampling crew was based in Quinhagak, coordinating sample crew availability with tender arrival in Quinhagak remained problematic. This was especially true for the coho salmon commercial season and resulted in no coho salmon ASL samples being collected from the District 5 commercial fishery in 2007. Delays between sampling crew scheduling and tender arrivals coupled with the relatively small District W-5 commercial harvest typically resulted in the catch being processed before sampling could occur. Additionally, the tender would sometimes arrive at the Quinhagak dock in the early morning hours when the sampling crew was not available. It is anticipated that these issues will be alleviated when CVRF begins operating a new fish processing plant in Platinum at the western end of Goodnews Bay in 2009. ADF&G is currently developing a program in cooperation with CVRF that will mimic the Quinhagak ASL sampling program at the new Platinum processing plant. Having a sampling crew directly on the grounds of District 5 where fish are delivered to the processing plant is expected to alleviate many of the logistical and scheduling conflicts currently being encountered by the Quinhagak based sampling crew.

ESCAPEMENT MONITORING AND ESTIMATES

Chinook Salmon

The 2007 Chinook salmon weir escapement of 3,852 fish exceeded the upper end of the BEG range by 25% and was just above the recent 10 year average from 1997 through 2006 (Figure 4; Appendix B1). The general trend of Chinook salmon escapement in the Middle Fork Goodnews River since 1981 indicates fluctuations of abundance and a recent higher relative abundance since 1992; however, it should be noted that the later trend may be affected by the 1991 change in methodology from counting tower to weir-based escapement estimates.

Sockeye Salmon

The 2007 sockeye salmon weir escapement of 72,282 fish and was the third highest escapement since Middle Fork Goodnews River escapement assessment projects were initiated in 1981, lagging behind only the 2 consecutive record escapement in 2005 and 2006 (Figure 4; Appendix B1). Sockeye salmon escapement in 2007 was 31.5% greater than the recent 10 year average of sockeye salmon escapement from 1997 through 2006. Sockeye salmon escapement in 2007 exceeded the upper end of the BEG range by 45%. The general trend of Middle Fork Goodnews River sockeye salmon escapement since 1981 indicates fluctuations of abundance and a higher relative abundance over the last 4 years. Similar to Chinook salmon, these trends may be affected by the 1991 change in methodology from counting tower to weir based escapement estimates;

however, sockeye salmon escapement since 2005 indicates a high level of production compared to prior year escapements.

Chum Salmon

The 2007 chum salmon weir escapement of 49,285 fish was the second highest escapement since Middle Fork Goodnews River escapement assessment projects were initiated in 1981 (Figure 4; Appendix B1). Chum salmon escapement in 2007 was 22% higher than the next highest escapement of 40,450 in 1996, and was 82% higher than the recent 10 year average of chum salmon escapement from 1997 through 2006. The general trend of chum salmon escapement into the Middle Fork Goodnews River since 1981 suggest fluctuations in abundance and a higher relative abundance since 1992; however, it should be noted again that the 1991 change in methodology from counting tower to weir-based escapement estimates may have caused inaccuracies in chum salmon escapement estimates prior to 1991.

Coho Salmon

The 2007 coho salmon weir escapement of 20,767 fish was below the average escapement since the project was extended to count coho salmon in 1997 (Figure 4; Appendix B1). Weir escapement in 2007 was 18.5% lower than the historical 10 year average from 1997 through 2006. The weir discontinued operations on 10 September because of high water. Historically, this time period has coincided with a high abundance of coho salmon counted through the weir; however, the historical median passage has achieved the 85% point by this date (Table 5; Figure 5). Alternatively, coho salmon migration timing has been shown to coincide with rising water levels (Linderman et al. 2003). During their inriver spawning migration, coho salmon typically move in pulses that are triggered by even small increases in water level. Water levels were low at the beginning of August in 2007, which may have reduced the frequency of pulses in migration that coho salmon typically exhibit resulting in delayed overall run timing. Additionally, the fish were moving through the weir in large pulses lasting from 1 to 2 days and would then taper off. Given this trend and the relationship between coho salmon migration and water level, another pulse may have coincided with the weir becoming inoperable for the remainder of the season. The weir escapement estimate reported here should be viewed as an index of coho salmon escapement in 2007 as the actual escapement past the weir may have been higher.

Dolly Varden

Dolly Varden counts at the Middle Fork Goodnews River weir date back to 1997 (Appendix B1). The 2007 Dolly Varden count of 1,549 fish was 46.3% below the 10 year average of 2,883 from 1997 to 2006. Dolly Varden passage in 2007 exhibited a bell shaped distribution throughout the majority of July, with small increases in passage in early July, compared to the bimodal separation between passage in July and August exhibited in 2000, 2001, and 2004 (Figure 6). Additional details and analysis of Goodnews River Dolly Varden populations can be found in Lisac 2003; 2007 and *In prep*.

The Dolly Varden counts generated by the weir project represent an unknown proportion of the overall Dolly Varden migration within the Middle Fork Goodnews River. The current spacing between weir panel pickets was chosen for optimal weir operations during high water events and for generating escapement counts of Chinook, sockeye, chum, and coho salmon. Findings from Lisac (2003) suggest that the weir count is size selective for larger Dolly Varden and it is believed younger and smaller fish pass through the weir unobserved. The Dolly Varden counts

generated at the weir should continue to be considered an index of Dolly Varden populations in the Middle Fork Goodnews River.

RUN TIMING ESTIMATES

Chinook salmon run timing in 2007 was later than the historical median by approximately 8 days (Table 5; Figure 5). Sockeye salmon run timing in 2007 coincided with the historical median passage date of 8 July. Chum salmon run timing was also late by approximately 7 days compared to the historical median. Coho salmon run timing in 2006 was later compared to the historical median by approximately 1 day (Figures 4 and 5).

RUN ABUNDANCE

Salmon spawn primarily in the North Fork and Middle Fork Rivers of the Goodnews River drainage and their associated lakes. It is thought that less than 10% of salmon returning to the Goodnews River spawn in the South Fork and no estimate is made for this portion of the drainage. Chinook and sockeye salmon escapements were estimated for the North Fork in 2007; however, because condition precluded aerial surveys in 2007, the recent 10 year average proportion between North Fork and Middle Fork aerial surveys was used to estimate North Fork salmon escapement (Table 4).

The combined escapement estimates from the North Fork and Middle Fork weir are used to characterize Goodnews River drainage-wide escapement (Table 4; Figure 7). Harvest and escapement estimates are combined to estimate total run abundance and exploitation for the Goodnews River drainage (Table 4; Appendix D1 and D2). Chum salmon run abundance for the Goodnews River drainage was not characterized for 2007, as aerial survey counts have been discontinued for chums. Chum salmon are difficult to observe from the air and their run timing is very protracted. The extended peak spawning period exhibited by chum salmon, the current "snapshot" aerial surveys used in the Goodnews River drainage are not viable as an index of chum salmon abundance. Even if multiple surveys were flown, it is unknown whether the resulting survey counts would be an accurate index of chum salmon abundance.

It is difficult to assess the quality or any directional bias of the estimates of total abundance and exploitation. Three main issues affect these estimates: 1) lack of 2007 estimates of subsistence and sport fish harvests, 2) lack of escapement monitoring in the South Fork of the Goodnews River drainage, and 3) the accuracy of using 10 year average aerial surveys proportions between the middle and north forks. However, the use of 10 year average sport and subsistence harvests should not have a large affect on estimates of total abundance and exploitation. The direction of the bias in total abundance and exploitation rates is known for the omission of South Fork Chinook and sockeye salmon. The estimates of total abundance will be biased low and the exploitation will be biased high. The bias is thought to be small and in a direction that leads managers to account for its potential effect when making management decisions.

An assumption necessary for an unbiased estimate of total escapement, abundance, and exploitation is that the proportion of observable salmon is equal between aerial surveys conducted on the Middle Fork and on the North Fork. Differences could arise with differences in environmental conditions or salmon run timing. If a higher proportion of observable salmon are counted above the Middle Fork compared to the North Fork, total escapement and abundance will be underestimated and exploitation will be biased high. The reverse will occur if a lower

proportion of observable salmon are counted during the aerial survey in the Middle Fork compared to the North Fork.

Experienced staff have not described any gross differences affecting aerial surveys between forks. Overall depth, water color, riparian vegetation, and substrate type is nearly identical between them, although the Middle Fork drainage is shorter than the North Fork. Aerial surveys of the North Fork and Middle Fork are typically conducted on the same day so conditions and methods used during each survey are also similar. Additionally, it is likely that surveys would be conducted by the same observer on each fork in a given year. These factors combined reduce the possibility of bias caused by differences in environmental conditions, methods, or different observers employed between both forks.

A different proportion of observable fish between forks may arise if spawning time is not the same or the survey area differs. For Chinook and coho salmon, these factors are not as pronounced because they are primarily main channel spawners, their peak spawning period is consistent between areas, and similar areas are surveyed. In contrast, sockeye salmon are primarily lake and lake tributary spawners. The time frame when sockeye salmon enter the lakes and later move into lake tributaries to spawn is a critical factor for sockeye salmon aerial surveys. If few sockeye salmon are observed in the Middle Fork lakes and the lake tributaries are not surveyed, it will be unknown whether abundance was actually low or if the majority of sockeye salmon had already moved into the lake tributaries to spawn. Alternatively, if large numbers of sockeye salmon were observed in North Fork lakes and lake tributaries were not surveyed, it will be unknown whether abundance was high compared to the Middle Fork lakes or if North Fork sockeye salmon had not yet moved into lake tributaries to spawn. In order to reduce this potential for bias, sockeye salmon aerial surveys should be conducted around the perimeter of the lakes but also on the lake spawning tributaries on a consistent annual basis for both forks. Historically, it is unclear whether sockeye aerial surveys of the Goodnews River drainage have consistently included lake tributaries. This uncertainty has been addressed in recent years through improvements and standardization of the Kuskokwim Area aerial survey program and the inclusion of lake spawning tributaries in all sockeye salmon aerial surveys.

There is also potential for directional bias of exploitation rate in 2007 with use of historical average aerial survey proportions to estimate North Fork sockeye salmon escapement. The current methodology employed to estimate North Fork escapement uses aerial survey counts to determine the proportion of fish escaping to each fork and applying that proportion to the known Middle Fork weir escapement. In the absence of aerial survey proportions in 2007 for sockeye salmon, an average aerial survey proportion was applied to weir escapement to generate the North Fork escapement estimate. If the average aerial survey proportion was lower than the actual proportion, exploitation would be biased high. Conversely, if the average aerial survey proportion was higher than the actual proportion, exploitation would be biased low. It is unclear in what direction average aerial survey proportions may be biasing total abundance and exploitation. However, it can be assumed that 2007 returns were not overexploited given the escapements of Chinook and sockeye salmon in 2007 and the relatively low trends in exploitation rates of Goodnews River stocks. On the contrary, any classification of Goodnews River salmon exploitation in 2007 would most likely be underutilized and it is believed that any potential bias is small and would have a negligible effect on total run and exploitation estimates.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

The following discussion focuses on describing ASL trends seen within Middle Fork Goodnews River weir escapement and District W-5 commercial harvest during 2007. Some comparisons are made indicating similarities and differences between the weir escapement and commercial harvest ASL estimates both for 2007 and historical ASL data. Probably the greatest value in collecting ASL information is for continued development of spawner-recruit models and future evaluation or revision of established escapement goals. This information can also be used for forecasting future runs, maintenance and revision of brood tables, and to illustrate long-term trends in ASL composition (for example, Bigler et al. 1996).

Chinook Salmon

Although sample objectives were not achieved for both the escapement and commercial Chinook salmon ASL estimates in 2007, some inferences can be made based on the samples that were collected. Age-1.4 Chinook salmon were the dominant age class for the aged escapement while age-1.2 Chinook were the dominant age class for the commercial (Tables 7 and 16). The disparity between dominate age classes in the commercial and escapement data may be caused by the relatively high proportion of smaller and younger Chinook salmon being harvested by the small mesh gear (6 in or less) used in the District 5 fishery. The aged escapement samples are consistent with the majority of age-1.3 Chinook salmon observed in 2006 returning in 2007 as age-1.4. This trend in age composition is also encouraging for future returns as relatively high percentages of age-1.2 fish in 2007, for both the commercial harvest and escapement, combined with an average Chinook salmon escapement in 2007 may indicate a good return of age-1.3 fish in 2008. Males were dominant in both the weir and commercial samples in 2007 which is consistent with historical trends in Chinook salmon sex ratios (Molyneaux et al. 2006).

Sockeye Salmon

Age-1.3 sockeye salmon were the dominant age class in the 2007 escapement and commercial harvest ASL estimates, which is consistent with historical ASL data (Tables 9 and 18; Figure 8). Age class percentages between ASL escapement estimates and commercial samples were relatively consistent across all age classes in 2007. This indicates that escapement ASL estimates could be used as a surrogate for commercial samples if necessary. Male to female percentages for 2007 escapement ASL estimates were nearly a 50/50 split for males and females, which contrasts commercial ASL samples that exhibited a split of 62.3% males and 37.7% females. Males and females exhibited modest length partitioning by age class for escapement ASL estimates in 2007, which was again consistent with the aged commercial ASL samples (Figures 9 and 10). Mean male and female lengths by age class were similar between shared age classes in the escapement ASL estimates and aged commercial samples. These age and length trends are consistent with the total for both escapement ASL estimates and aged commercial samples.

Chum Salmon

Age-0.3 chum salmon were the dominant age class for escapement and commercial ASL estimates in 2007, which is consistent with historical data (Tables 12 and 20; Figure 8). Age class percentages between ASL escapement and commercial estimates were relatively consistent across all age classes. This indicates that 2007 escapement ASL estimates could be used as a surrogate for commercial samples if necessary. Male to female percentages were near 50–50, for the escapement and commercial ASL estimates in 2007, which is consistent with historical totals

for escapement and commercial ASL estimates. Mean male and female lengths by age class in the 2007 escapement and commercial ASL estimates indicated modest length partitioning by age class, which is again consistent with totals for both escapement and commercial ASL estimates (Figures 9 and 10).

Coho Salmon

Age-2.1 coho salmon were the dominant age class for escapement ASL estimates which is consistent with historical trends in coho salmon escapement (Table 13; Figure 8). Male to female percentages were near 50–50 for the escapement ASL estimates in 2007, which is consistent with historical totals for escapement and commercial ASL estimates. The escapement ASL estimates do not indicate length partitioning by age class for male or female fish (Figures 9 and 10).

CONCLUSIONS

WEIR OPERATIONS

The project has:

1. Demonstrated the ability to successfully enumerate the majority of the Chinook, sockeye, and chum salmon escapement for the Middle Fork Goodnews River during the target operational period.
2. Provided run timing information for Middle Fork Goodnews River salmon and Dolly Varden populations.
3. Demonstrated the ability to generate total abundance estimates for Goodnews River drainage Chinook and sockeye salmon.
4. Demonstrated the ability to achieve its annual ASL objectives for escapement and commercial harvest in most years.
5. Demonstrated the ability to generate an abundance estimate for Middle Fork Goodnews River Dolly Varden populations.
6. Provided a platform for the collection of genetic information from salmon and Dolly Varden.
7. Provided climate information on an annual basis.

ESCAPEMENT AND RUN ABUNDANCE

Salmon escapement at the weir met or exceeded all establish escapement goals in 2007.

Estimated Chinook, sockeye, and chum salmon weir escapements were above the recent 10 year averages. Estimated coho salmon weir escapement was below the historical average since coho operations were fully implemented in 1997.

Aerial surveys for Chinook and sockeye salmon were not completed in 2007 because of poor survey conditions. Goodnews River Chinook and sockeye salmon escapement was estimated based on the 10 year average proportion of aerial survey counts between the North and Middle Forks.

AGE, SEX, AND LENGTH COMPOSITION

Chinook salmon escapement ASL sampling did not achieve sample objectives in 2007 but is believed to be adequate to describe the age, sex, and length characteristics of the run; however, commercial Chinook salmon and sockeye, chum, and coho salmon escapement and commercial ASL samples were adequate to estimate ASL characteristics of the runs in 2007.

Chinook, sockeye, chum, and coho salmon escapement and commercial ASL estimates in 2007 were consistent with historical escapement and commercial ASL estimates and trends.

RECOMMENDATIONS

Annual operation of the Middle Fork Goodnews River weir should continue indefinitely. As the only ground based monitoring project in District W-5 (Goodnews Bay District), the project provides valuable inseason and postseason information about Chinook, sockeye, chum, and coho salmon that are critical for sustainable salmon management practices.

WEIR OPERATIONS AND ASL SAMPLING

After the season, the substrate rail should be left in the deeper portion of the channel to speed spring installation and startup and be removed from the shallower portion to avoid scouring over the winter. The shallow portion currently extends 80 ft from the north bank. This portion of the river goes dry in the winter and is subject to frost heaving, which displaces the rail and causes scouring during the spring flood.

Active sampling for Chinook salmon should continue in order to meet ASL sample size goals and additional live traps should be deployed when time and funding allows to accommodate additional Chinook salmon ASL sample collection.

Commercial ASL sampling should be conducted on the commercial tender in District 5 during commercial openings to aid in achieving ASL sample objectives. It is recommended that ADF&G staff work closely with the local buyer to gain access to the tender inseason in order to collect ASL samples on site within the district.

FISH PASSAGE AND ESCAPEMENT ESTIMATION

Additional efforts are recommended to obtain aerial survey information on the Middle Fork and North Fork Rivers of the Goodnews drainage to estimate total escapement.

Additional efforts are recommended to generate more accurate Dolly Varden weir counts. This is difficult to achieve as the current spacing between weir panel pickets was chosen for optimal weir operations during high water events and escapement counts of Chinook, sockeye, chum, and coho salmon, which are larger in size overall compared to Dolly Varden. Major modifications to the weir would be required that will reduce its effectiveness during higher water events. A methodology supplementing the current weir is needed to achieve more accurate assessments of Middle Fork Goodnews River Dolly Varden populations.

Implementing a target operational period and developing methods for estimating salmon passage missed during this period as described in Linderman et al. (2004) is also recommended.

HARVEST AND EXPLOITATION

Results of brood table analysis and development of BEGs for Middle Fork Chinook and sockeye salmon has indicated Goodnews River Chinook and sockeye salmon stocks can be sustained at higher levels of exploitation. Management actions that could be taken to increase harvest include more frequent openings, longer openings, and increasing net lengths from one to 2 shackles. Increasing harvest is difficult in district W-5 however, as fishing effort is near historical lows and catch processing capacity is limited.

HISTORICAL DATA EVALUATION

There is a need to continue to revisit historical data regarding the Goodnews River drainage and verify data to check for correctness, consistency, and completion. Further evaluation is also needed for Middle Fork Goodnews River weir escapement estimates, as target operational dates are inconsistent between years and some years lack estimates when the weir was not operational. The lack of expansion and estimates in a given year has caused staff to underestimate the number of salmon that escape into the Middle Fork Goodnews River weir. This in turn could result in over estimates of exploitation, less accurate escapement goals, and affect management decisions.

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TABLES AND FIGURES

Table 1.–Brood table for Middle Fork Goodnews River Chinook salmon.

Year	MF Escapement	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Total Recruits	yield	Recruits/ Spawner
1981	3,688	0	7	1,232	1,968	2,370	599	0	6176	2,488	1.7
1982	1,395	0	30	489	1,306	2,554	228	0	4,609	3,214	3.3
1983	6,027	0	15	495	1,209	2,136	264	9	4,128	-1,899	0.7
1984	3,260	0	16	681	1,615	2,386	271	0	4,969	1,709	1.5
1985	2,831	0	0	242	899	971	109	0	2,221	-610	0.8
1986	2,080	0	14	1,846	984	1,712	207	0	4,762	2,682	2.3
1987	2,272	0	26	578	1,231	1,561	604	0	4,000	1,728	1.8
1988	2,712	0	0	628	964	2,614	49	1	4,256	1,544	1.6
1989	1,915	0	41	949	1,781	3,846	201	0	6,817	4,902	3.6
1990	3,636	0	17	427	1,080	1,722	10	0	3,256	-380	0.9
1991	1,952	0	65	1,643	1,100	1,167	275	0	4,250	2,298	2.2
1992	1,905	0	0	781	358	2,034	93	0	3,267	1,362	1.7
1993	2,349	0	30	2,114	4,044	2,743	65	0	8,997	6,648	3.8
1994	3,856	0	24	786	606	1,048	234	0	2,698	-1,158	0.7
1995	4,836	0	142	1,156	3,073	4,568	145	0	9,084	4,248	1.9
1996	2,931	0	23	813	1,278	1,526	138	0	3,778	847	1.3
1997	2,937	0	28	351	1,021	1,129	42	0	2,571	-366	0.9
1998	4,584	0	51	1,309	1,272	1,024	9	0	3,666	-918	0.8
1999	3,221	0	7	526	1,251	1,285	107	0	3,177	-44	1.0
2000	2,500	0	81	2,886	3,366	1,853	152	0	8,338	5,838	3.3
2001	5,351	0	124	1,084	1,559	2,019	0	0	4,786		
2002	3,085	0	6	1,998	1,404	0	0	0	3,408		
2003	2,389	0	66	1,945	0	0	0	0	2,011		
2004	4,388	0	46	0	0	0	0	0	46		
2005	4,633	0	0	0	0	0	0	0	0		
2006	4,559	0	0	0	0	0	0	0	0		
2007	3,852	0	0	0	0	0	0	0	0		
Average											1.8

Note: Only data bordered by black line were used in spawner-recruit analysis.

Table 2.–Brood table for Middle Fork Goodnews River sockeye salmon.

Year	MF Escapement	Age 3	Age 4	Age 5	Age 6	Age 7	Total Recruit	Yield	Recruit/Spawner
1981	49,108	41	8,929	64,113	1,155	21	74,258	25,150	1.5
1982	56,255	31	4,111	40,635	1,423	0	46,200	-10,055	0.8
1983	25,816	0	3,114	32,033	2,213	0	37,360	11,544	1.4
1984	32,053	0	2,994	30,857	5,585	0	39,435	7,382	1.2
1985	24,131	21	2,159	34,837	3,806	209	41,032	16,901	1.7
1986	51,069	0	14,232	63,441	4,008	209	81,890	30,821	1.6
1987	28,871	539	6,084	29,112	5,351	57	41,142	12,271	1.4
1988	15,799	265	17,596	38,795	7,039	0	63,695	47,896	4.0
1989	21,186	1,817	20,045	82,777	5,620	36	110,295	89,109	5.2
1990	31,679	353	5,686	49,954	4,387	260	60,640	28,961	1.9
1991	47,397	0	7,390	68,200	8,064	65	83,718	36,321	1.8
1992	27,268	0	5,446	35,537	6,551	145	47,679	20,411	1.7
1993	26,452	82	11,125	51,444	4,729	0	67,378	40,926	2.5
1994	50,801	150	13,136	49,823	2,399	0	65,508	14,707	1.3
1995	39,009	0	9,292	51,716	4,208	78	65,295	26,286	1.7
1996	58,290	0	3,214	23,942	2,537	0	29,694	-28,596	0.5
1997	35,530	0	837	10,369	3,777	0	14,983	-20,547	0.4
1998	49,513	0	13,027	46,901	5,612	0	65,540	16,027	1.3
1999	48,205	0	4,840	40,651	6,118	0	51,609	3,404	1.1
2000	32,341	0	20,946	101,610	11,088	0	133,644	101,303	4.1
2001	21,024	0	17,555	100,679	5,088	0	123,322	102,298	5.9
2002	22,101	0	29,120	52,335	0	0	81,456		
2003	44,387	0	38,211	0	0	0	38,211		
2004	55,926	361	0	0	0	0	361		
2005	113,809	0	0	0	0	0	0		
2006	126,772	0	0	0	0	0	0		
2007	72,282	0	0	0	0	0	0		
Average									2.1

Note: Only data bordered by black line were used in spawner-recruit analysis.

Table 3.–Daily and cumulative Chinook, sockeye, chum, and coho salmon passage, Middle Fork Goodnews River weir, 2007.

	Chinook		Sockeye		Chum		Coho	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
6/25	4	4	508	508	105	105	0	0
6/26	13	17	1,284	1,792	48	153	0	0
6/27	6	23	442	2,234	11	164	0	0
6/28	12	35	1,711	3,945	27	191	0	0
6/29	39	74	2,036	5,981	191	382	0	0
6/30	23	97	820	6,801	48	430	0	0
7/01	54	151	3,855	10,656	191	621	0	0
7/02	28	179	2,392	13,048	149	770	0	0
7/03	104	283	5,836	18,884	362	1,132	0	0
7/04	89	372	3,651	22,535	284	1,416	0	0
7/05	143	515	4,475	27,010	352	1,768	0	0
7/06	31	546	5,155	32,165	159	1,927	0	0
7/07	43	589	3,189	35,354	421	2,348	0	0
7/08	86	675	4,375	39,729	1,898	4,246	0	0
7/09	48	723	1,106	40,835	1,046	5,292	0	0
7/10	93	816	553	41,388	407	5,699	0	0
7/11	143	959	2,626	44,014	1,154	6,853	0	0
7/12	126 [a]	1,085	1,208 [a]	45,222	510 [a]	7,363	0 [a]	0
7/13	90	1,175	2,312	47,534	453	7,816	0	0
7/14	36	1,211	1,991	49,525	530	8,346	0	0
7/15	91	1,302	1,905	51,430	757	9,103	0	0
7/16	139	1,441	2,945	54,375	1,783	10,886	0	0
7/17	307	1,748	2,273	56,648	2,712	13,598	0	0
7/18	265	2,013	2,115	58,763	4,389	17,987	0	0
7/19	462	2,475	1,597	60,360	2,639	20,626	0	0
7/20	120	2,595	1,141	61,501	1,773	22,399	0	0
7/21	19	2,614	370	61,871	303	22,702	0	0
7/22	123	2,737	1,075	62,946	997	23,699	1	1
7/23	57	2,794	487	63,433	1,584	25,283	0	1
7/24	103	2,897	791	64,224	3,396	28,679	0	1
7/25	38	2,935	277	64,501	973	29,652	0	1
7/26	89	3,024	548	65,049	2,240	31,892	0	1
7/27	105 [a]	3,129	339 [a]	65,388	1,403 [a]	33,295	1 [a]	2
7/28	140	3,269	287	65,675	815	34,110	1	3
7/29	7	3,276	105	65,780	393	34,503	0	3
7/30	176	3,452	405	66,185	1,916	36,419	5	8
7/31	32	3,484	166	66,351	579	36,998	2	10
8/01	17	3,501	195	66,546	922	37,920	4	14
8/02	99	3,600	309	66,855	1,627	39,547	21	35

-continued-

Table 3.–Page 2 of 3.

	Chinook		Sockeye		Chum		Coho	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
8/03	96	3,696	393	67,248	1,116	40,663	57	92
8/04	14	3,710	189	67,437	698	41,361	43	135
8/05	22 [b]	3,732	243 [b]	67,680	1,147 [b]	42,508	60 [b]	195
8/06	9 [b]	3,741	88 [b]	67,768	421 [b]	42,929	90 [b]	285
8/07	17 [b]	3,758	204 [b]	67,972	921 [b]	43,850	57 [b]	342
8/08	12	3,770	153	68,125	706	44,556	74	416
8/09	5	3,775	187	68,312	1,076	45,632	70	486
8/10	5	3,780	175	68,487	606	46,238	144	630
8/11	9	3,789	152	68,639	397	46,635	114	744
8/12	5	3,794	193	68,832	458	47,093	145	889
8/13	11 [a]	3,806	192 [a]	69,024	429 [a]	47,522	194 [a]	1,083
8/14	4	3,810	125	69,149	212	47,734	91	1,174
8/15	2	3,812	177	69,326	170	47,904	111	1,285
8/16	7	3,819	244	69,570	314	48,218	269	1,554
8/17	7	3,826	202	69,772	210	48,428	203	1,757
8/18	3	3,829	159	69,931	140	48,568	289	2,046
8/19	3	3,832	217	70,148	112	48,680	276	2,322
8/20	2	3,834	243	70,391	119	48,799	579	2,901
8/21	1	3,835	175	70,566	79	48,878	691	3,592
8/22	2	3,837	176	70,742	60	48,938	616	4,208
8/23	3	3,840	180	70,922	75	49,013	629	4,837
8/24	1	3,841	157	71,079	70	49,083	1,074	5,911
8/25	2	3,843	117	71,196	22	49,105	566	6,477
8/26	0	3,843	107	71,303	29	49,134	335	6,812
8/27	0	3,843	118	71,421	39	49,173	765	7,577
8/28	1	3,844	84	71,505	15	49,188	1,204	8,781
8/29	2	3,846	95	71,600	12	49,200	865	9,646
8/30	0	3,846	37	71,637	4	49,204	305	9,951
8/31	0	3,846	71	71,708	9	49,213	262	10,213
9/01	4	3,850	104	71,812	17	49,230	479	10,692
9/02	1	3,851	59	71,871	9	49,239	750	11,442
9/03	1	3,852	63	71,934	11	49,250	1,221	12,663
9/04	0	3,852	86	72,020	11	49,261	1,062	13,725
9/05	0	3,852	53	72,073	3	49,264	390	14,115
9/06	0	3,852	32	72,105	2	49,266	133	14,248
9/07	0	3,852	39	72,144	0	49,266	158	14,406
9/08	0	3,852	25	72,169	9	49,275	1,368	15,774
9/09	0	3,852	52	72,221	2	49,277	508	16,282
9/10	0	3,852	61	72,282	8	49,285	342	16,624
9/11	0 [b]	3,852	0 [b]	72,282	0 [b]	49,285	1,315 [b]	17,939

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	Chinook		Sockeye		Chum		Coho	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
9/12	0 [b]	3,852	0 [b]	72,282	0 [b]	49,285	712 [b]	18,651
9/13	0 [b]	3,852	0 [b]	72,282	0 [b]	49,285	981 [b]	19,632
9/14	0 [b]	3,852	0 [b]	72,282	0 [b]	49,285	243 [b]	19,876
9/15	0 [b]	3,852	0 [b]	72,282	0 [b]	49,285	168 [b]	20,044
9/16	0 [b]	3,852	0 [b]	72,282	0 [b]	49,285	398 [b]	20,442
9/17	0 [b]	3,852	0 [b]	72,282	0 [b]	49,285	209 [b]	20,651
9/18	0 [b]	3,852	0 [b]	72,282	0 [b]	49,285	324 [b]	20,767
Total	3,852		72,282		49,285		20,767	
Observed	3,736		71,437		48,973		16,416	
Estimated	116		845		312		4,351	
% Observed	96.99		98.83		99.37		79.05	

[a] Daily passage was estimated because of a breach in the weir.

[b] The weir was not operational; daily passage was estimated.

Table 4.–Escapement summary for the Goodnews River, 2007.

Middle Fork Goodnews River escapement estimate				
	Chinook	Sockeye	Chum	Coho
2007 weir count	3,852	72,282	49,285	20,767
Weir (BEG)	1,500-2,900	18,000-40,000		
Weir (SEG)			>12,000	>12,000
10-year average (1997–2006)	3,765	54,961	27,127	25,483
2007 aerial survey count	[a]	[a]	[b]	[b]

North Fork Goodnews River escapement estimate				
	Chinook	Sockeye	Chum	Coho
2007 escapement estimate [c]	5,618	63,782	[b]	[b]
10-year average (1997–2006)	6,407	56,734	[b]	[b]
2007 aerial survey count	[a]	[a]	[b]	[b]
Aerial Survey (SEG)	640–3,300	5,500–19,500	[c]	[c]

Goodnews River (total drainage) escapement estimate				
	Chinook	Sockeye	Chum	Coho
2007	9,469	136,064	[b]	[b]
10-year average (1997–2006)	13,443	138,262	[c]	[c]

Total Run and Exploitation				
	Chinook	Sockeye	Chum	Coho
District W-5 Commercial Harvest	3,112	43,716	7,519	13,689
Subsistence Harvest [d]	773	920	302	722
Sport Fishing Harvest [d]	222	203	41	836
Total Run Estimate	13,576	180,903	[b]	[b]
Harvest Exploitation (%)	30.2	24.8	[b]	[b]

[a] Survey was incomplete.

[b] No estimate was made.

[c] Escapement goal discontinued in 2004.

[d] Official estimates not available at time of publication, numbers shown are the recent 10 year averages (1996–2005) of Goodnews Bay area subsistence and Goodnews River sport fishing harvest.

Table 5.–Chinook, sockeye, chum, and coho salmon and Dolly Varden cumulative percent passage, Middle Fork Goodnews River weir, 2007 and historical median.

	Chinook Salmon		Sockeye Salmon		Chum Salmon		Coho Salmon		Dolly Varden	
Date	2007	Median[a]	2007	Median[b]	2007	Median[c]	2007	Median[d]	2007	Median[e]
6/25	0	3	1	7	0	1	0	0	0	0
6/26	0	4	2	9	0	1	0	0	0	0
6/27	1	7	3	11	0	2	0	0	0	0
6/28	1	8	5	13	0	2	0	0	0	1
6/29	2	10	8	17	1	3	0	0	1	1
6/30	3	14	9	20	1	4	0	0	1	1
7/01	4	17	15	24	1	6	0	0	2	2
7/02	5	21	18	28	2	6	0	0	2	3
7/03	7	24	26	28	2	8	0	0	4	4
7/04	10	28	31	33	3	11	0	0	7	6
7/05	13	35	37	39	4	13	0	0	8	8
7/06	14	37	44	44	4	14	0	0	11	9
7/07	15	38	49	49	5	17	0	0	16	9
7/08	18	41	55	55	9	19	0	0	21	11
7/09	19	47	56	56	11	22	0	0	23	13
7/10	21	49	57	62	12	26	0	0	23	14
7/11	25	56	61	67	14	28	0	0	27	22
7/12	28	60	63	71	15	32	0	0	28	22
7/13	31	64	66	74	16	36	0	0	31	23
7/14	31	68	69	78	17	39	0	0	35	23
7/15	34	70	71	80	18	42	0	0	38	24
7/16	37	73	75	82	22	46	0	0	42	27
7/17	45	75	78	84	28	52	0	0	45	34
7/18	52	77	81	87	36	55	0	0	48	43
7/19	64	81	84	89	42	60	0	0	53	51
7/20	67	82	85	90	45	63	0	0	56	56
7/21	68	84	86	92	46	65	0	0	61	61
7/22	71	85	87	93	48	69	0	0	63	63
7/23	73	85	88	94	51	73	0	0	65	65
7/24	75	88	89	94	58	74	0	0	66	66
7/25	76	90	89	95	60	77	0	0	67	67
7/26	79	91	90	96	65	81	0	0	68	68
7/27	81	91	90	96	68	82	0	0	69	69
7/28	85	93	91	98	69	83	0	0	73	73
7/29	85	94	91	98	70	86	0	0	74	78
7/30	90	95	92	98	74	88	0	0	75	80
7/31	90	95	92	98	75	90	0	0	76	82
8/01	91	96	92	99	77	92	0	0	78	84

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	Chinook Salmon		Sockeye Salmon		Chum Salmon		Coho Salmon		Dolly Varden	
Date	2007	Median [a]	2007	Median [b]	2007	Median[c]	2007	Median [d]	2007	Median[e]
8/02	93	96	92	99	80	93	0	0	79	87
8/03	96	97	93	99	83	94	0	0	81	89
8/04	96	98	93	99	84	95	1	0	82	90
8/05	97	98	94	99	86	95	1	0	82	92
8/06	97	98	94	99	87	96	1	0	83	93
8/07	98	98	94	99	89	97	2	0	83	93
8/08	98	98	94	99	90	97	2	1	84	94
8/09	98	98	95	99	93	98	2	1	85	94
8/10	98	98	95	99	94	98	3	1	86	95
8/11	98	98	95	99	95	98	4	1	86	95
8/12	99	99	95	99	96	98	4	2	87	95
8/13	99	99	95	99	96	99	5	2	88	96
8/14	99	99	96	99	97	99	6	2	88	96
8/15	99	99	96	100	97	99	6	3	88	96
8/16	99	99	96	100	98	99	7	4	89	96
8/17	99	100	97	100	98	99	8	5	90	96
8/18	99	100	97	100	99	99	10	6	91	97
8/19	99	100	97	100	99	99	11	7	92	97
8/20	100	100	97	100	99	100	14	8	92	97
8/21	100	100	98	100	99	100	17	11	93	97
8/22	100	100	98	100	99	100	20	12	94	98
8/23	100	100	98	100	99	100	23	14	95	98
8/24	100	100	98	100	100	100	28	16	96	98
8/25	100	100	98	100	100	100	31	18	97	98
8/26	100	100	99	100	100	100	32	24	97	98
8/27	100	100	99	100	100	100	36	27	97	98
8/28	100	100	99	100	100	100	42	34	97	98
8/29	100	100	99	100	100	100	46	34	98	98
8/30	100	100	99	100	100	100	47	44	98	98
8/31	100	100	99	100	100	100	49	51	98	98
9/01	100	100	99	100	100	100	51	57	98	99
9/02	100	100	99	100	100	100	55	58	98	99
9/03	100	100	100	100	100	100	60	60	99	99
9/04	100	100	100	100	100	100	65	67	99	99
9/05	100	100	100	100	100	100	67	73	99	99
9/06	100	100	100	100	100	100	68	75	99	99
9/07	100	100	100	100	100	100	69	82	99	99
9/08	100	100	100	100	100	100	75	83	99	100
9/09	100	100	100	100	100	100	78	84	100	100

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	Chinook Salmon		Sockeye Salmon		Chum Salmon		Coho Salmon		Dolly Varden	
Date	2007	Median [a]	2007	Median [b]	2007	Median[c]	2007	Median [d]	2007	Median[e]
9/10	100	100	100	100	100	100	79	85	100	100
9/11	100	100	100	100	100	100	86	86	100	100
9/12	100	100	100	100	100	100	89	91	100	100
9/13	100	100	100	100	100	100	94	94	100	100
9/14	100	100	100	100	100	100	95	95	100	100
9/15	100	100	100	100	100	100	96	96	100	100
9/16	100	100	100	100	100	100	97	97	100	100
9/17	100	100	100	100	100	100	98	98	100	100
9/18	100	100	100	100	100	100	100	99	100	100

Note: Boxes represent the central 50% of the run and median date of passage. Shaded areas represent the central 80% of the run.

[a] Historical median for years: 1981, 1990 through 1997, 1999, and 2001 through 2005.

[b] Historical median for years: 1981, 1984, 1992 through 1997, 1999, and 2002 through 2005.

[c] Historical median for years: 1981, 1991 through 1997, 1999, and 2001 through 2005.

[d] Historical median for years: 1997 through 2005.

[e] Historical median for years: 1997 through 2005.

Table 6.–Daily and cumulative pink salmon and Dolly Varden passage, Middle Fork Goodnews River weir, 2007.

	Pink Salmon		Dolly Varden	
Date	Daily	Cum.	Daily	Cum.
6/25	0	0	1	1
6/26	0	0	1	2
6/27	0	0	0	2
6/28	0	0	0	2
6/29	0	0	10	12
6/30	0	0	1	13
7/01	0	0	11	24
7/02	8	8	9	33
7/03	70	78	24	57
7/04	208	286	48	105
7/05	28	314	22	127
7/06	15	329	39	166
7/07	19	348	81	247
7/08	102	450	76	323
7/09	64	514	34	357
7/10	47	561	7	364
7/11	52	613	60	424
7/12	98	711	15	439
7/13	34	745	38	477
7/14	46	791	58	535
7/15	32	823	48	583
7/16	46	869	72	655
7/17	98	967	49	704
7/18	180	1,147	38	742
7/19	195	1,342	84	826
7/20	123	1,465	48	874
7/21	128	1,593	76	950
7/22	205	1,798	27	977
7/23	186	1,984	27	1,004
7/24	233	2,217	21	1,025
7/25	20	2,237	11	1,036
7/26	118	2,355	16	1,052
7/27	145	2,500	20	1,072
7/28	195	2,695	59	1,131
7/29	82	2,777	17	1,148
7/30	188	2,965	16	1,164
7/31	96	3,061	18	1,182
8/01	11	3,072	28	1,210
8/02	169	3,241	21	1,231
8/03	152	3,393	25	1,256
8/04	76	3,469	9	1,265
8/05	116	3,585	10	1,275
8/06	15	3,600	8	1,283
8/07	34	3,634	9	1,292
8/08	66	3,700	8	1,300

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Table 6.–Page 2 of 2.

Date	Pink Salmon Daily	Pink Salmon Cum.	Dolly Varden Daily	Dolly Varden Cum.
8/09	66	3,766	11	1,311
8/10	58	3,824	15	1,326
8/11	38	3,862	10	1,336
8/12	79	3,941	11	1,347
8/13	66	4,007	9	1,356
8/14	25 [a]	4,032	4 [a]	1,360
8/15	40	4,072	9	1,369
8/16	93	4,165	15	1,384
8/17	59	4,224	7	1,391
8/18	45	4,269	16	1,407
8/19	55	4,324	12	1,419
8/20	55	4,379	10	1,429
8/21	40	4,419	15	1,444
8/22	63	4,482	12	1,456
8/23	28	4,510	10	1,466
8/24	42	4,552	15	1,481
8/25	32	4,584	17	1,498
8/26	13	4,597	6	1,504
8/27	30	4,627	5	1,509
8/28	28	4,655	1	1,510
8/29	23	4,678	5	1,515
8/30	4	4,682	1	1,516
8/31	8	4,690	1	1,517
9/01	24	4,714	4	1,521
9/02	27	4,741	3	1,524
9/03	26	4,767	6	1,530
9/04	20	4,787	6	1,536
9/05	10	4,797	1	1,537
9/06	5	4,802	1	1,538
9/07	1	4,803	0	1,538
9/08	6	4,809	2	1,540
9/09	2	4,811	5	1,545
9/10	8	4,819	4	1,549
9/11	[b]	4,819	[b]	1,549
9/12	[b]	4,819	[b]	1,549
9/13	[b]	4,819	[b]	1,549
9/14	[b]	4,819	[b]	1,549
9/15	[b]	4,819	[b]	1,549
9/16	[b]	4,819	[b]	1,549
9/17	[b]	4,819	[b]	1,549
9/18	[b]	4,819	[b]	1,549
Total	4,819		1,549	

[a] Partial day counts because of a breach in weir, no estimates were made.

[b] The weir was not operational; daily passage was not estimated.

Table 7.–Age and sex composition of Chinook salmon escapement, Middle Fork Goodnews River weir, 2007.

Sample Dates (stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Esc.	1.1 %	1.2 Esc.	1.2 %	1.3 Esc.	1.3 %	1.4 Esc.	1.4 %	2.3 Esc.	2.3 %	1.5 Esc.	1.5 %	2.4 Esc.	2.4 %	Total Esc.	Total %
7/4-13	58	49	M	25	2.0	643	53.1	272	22.4	49	4.1	0	0.0	0	0.0	0	0.0	989	81.7
(6/25-7/14)			F	0	0.0	0	0.0	49	4.1	173	14.3	0	0.0	0	0.0	0	0.0	222	18.3
			Subtotal	25	2.0	643	53.1	321	26.5	222	18.4	0	0.0	0	0.0	0	0.0	1,211	100.0
7/15-21	87	60	M	23	1.7	398	28.3	234	16.7	140	10.0	0	0.0	0	0.0	0	0.0	795	56.7
(7/15-21)			F	0	0.0	0	0.0	210	15.0	351	25.0	0	0.0	23	1.7	23	1.7	607	43.3
			Subtotal	23	1.7	398	28.3	444	31.7	491	35.0	0	0.0	23	1.7	23	1.7	1,402	100.0
7/23-27	56	42	M	0	0.0	49	9.5	110	21.4	86	16.7	0	0.0	0	0.0	0	0.0	245	47.5
(7/22-27)			F	0	0.0	0	0.0	25	4.8	221	42.8	0	0.0	0	0.0	25	4.8	271	52.5
			Subtotal	0	0.0	49	9.5	135	26.2	307	59.5	0	0.0	0	0.0	25	4.8	516	100.0
7/28-8/20	71	59	M	0	0.0	208	28.8	61	8.5	110	15.3	12	1.7	0	0.0	0	0.0	391	54.1
(7/28-9/18)			F	0	0.0	0	0.0	86	11.8	209	28.8	0	0.0	25	3.4	12	1.7	332	45.9
			Subtotal	0	0.0	208	28.8	147	20.3	319	44.1	12	1.7	25	3.4	12	1.7	723	100.0
Season	272	210	M	48	1.2	1,297	33.7	678	17.6	386	10.0	12	0.3	0	0.0	0	0.0	2,421	62.9
			F	0	0.0	0	0.0	370	9.6	953	24.8	0	0.0	48	1.2	60	1.6	1,431	37.1
			Subtotal	48	1.2	1,297	33.7	1,048	27.2	1,339	34.8	12	0.3	48	1.2	60	1.6	3,852	100.0
Grand Total [a]		1,293	M	171	0.9	5,434	27.7	4,055	20.7	2,784	14.2	12	0.1	74	0.4	0	0.0	12,538	63.9
			F	0	0.0	56	0.3	1,499	7.6	5,191	26.5	0	0.0	279	1.4	60	0.3	7,073	36.1
			Total	171	0.9	5,490	28.0	5,553	28.3	7,975	40.7	12	0.1	353	1.8	60	0.3	19,612	100.0

Note: The numbers of fish in each stratum age and sex category are derived from the sample percentages; discrepancies are attributed to rounding errors.

[a] The number of fish in "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1991, 1995, 1997, 2000, 2002 and 2003.

Table 8.–Mean length (mm) of Chinook salmon escapement, Middle Fork Goodnews River weir, 2007.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	1.3	1.4	1.5	2.4
7/4-13	M	Mean Length	360	518	680	815		
(6/25-7/14)		Std. Error	-	8	14	25		
		Range	360- 360	440- 580	625- 770	790- 840		
		Sample Size	1	25	11	2	0	0
	F	Mean Length			778	818		
		Std. Error			43	14		
		Range			735- 820	772- 880		
		Sample Size	0	0	2	7	0	0
7/15-21	M	Mean Length	328	549	733	841		
(7/15-21)		Std. Error	-	15	19	28		
		Range	328- 328	433- 660	640- 810	780- 940		
		Sample Size	1	17	10	6	0	0
	F	Mean Length			768	840	852	872
		Std. Error			22	14	-	-
		Range			667- 840	730- 910	852- 852	872- 872
		Sample Size	0	0	9	15	1	1
7/23-27	M	Mean Length		606	719	878		
(7/22-27)		Std. Error		19	17	19		
		Range		581- 664	633- 780	820- 975		
		Sample Size	0	4	9	7	0	0
	F	Mean Length			771	852		751
		Std. Error			60	15		19
		Range			711- 831	715- 980		732- 770
		Sample Size	0	0	2	18	0	2
7/28-8/20	M	Mean Length		530	705	830		
(7/28-9/18)		Std. Error		11	33	29		
		Range		415- 592	595- 800	663- 920		
		Sample Size	0	17	5	9	0	0
	F	Mean Length			794	828	843	870
		Std. Error			12	11	18	-
		Range			745- 830	778- 910	825- 860	870- 870
		Sample Size	0	0	7	17	2	1

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Table 8.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	1.3	1.4	1.5	2.4
Season	M	Mean Length	344	533	707	843		
		Range	328- 360	415- 664	595- 810	663- 975		
		Sample Size	2	63	35	24	0	0
	F	Mean Length			776	836	847	822
		Range			667- 840	715- 980	825- 860	732- 872
		Sample Size	0	0	20	57	3	4
Grand Total [a]	M	Mean Length	376	544	713	851	886	
		Range	240- 550	360- 850	550- 910	680- 1035	700- 990	
		Sample Size	14	296	295	181	6	0
	F	Mean Length		610	786	854	888	822
		Range		540- 670	560- 880	470- 1005	705- 990	732- 872
		Sample Size	0	3	110	359	21	4

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1991, 1995, 1997, 2000, and 2002–2003.

Table 9.–Age and sex composition of sockeye salmon escapement, Middle Fork Goodnews River weir, 2007.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Esc.	0.2 %	0.3 Esc.	0.3 %	1.2 Esc.	1.2 %	0.4 Esc.	0.4 %	1.3 Esc.	1.3 %	2.2 Esc.	2.2 %	1.4 Esc.	1.4 %	2.3 Esc.	2.3 %	Total Esc.	Total %
7/4,6-7	209	168	M	0	0	1,894	5.3	1,683	4.8	0	0.0	12,837	36.3	211	0.6	1,263	3.6	842	2.4	18,729	53.0
(6/25-7/7)			F	0	0	1,052	3.0	1,894	5.3	210	0.6	12,416	35.1	210	0.6	210	0.6	631	1.8	16,625	47.0
			Subtotal	0	0	2,946	8.3	3,577	10.1	210	0.6	25,253	71.4	421	1.2	1,473	4.2	1,473	4.2	35,354	100.0
7/12,15	200	146	M	0	0	651	3.4	781	4.1	0	0.0	6,775	35.6	130	0.7	261	1.4	521	2.7	9,120	47.9
(7/8-16)			F	0	0	912	4.8	1,303	6.9	0	0.0	7,165	37.7	391	2.0	130	0.7	0	0.0	9,901	52.1
			Subtotal	0	0	1,563	8.2	2,084	11.0	0	0.0	13,940	73.3	521	2.7	391	2.1	521	2.7	19,021	100.0
7/19-21	253	177	M	0	0	461	5.1	512	5.7	0	0.0	2,252	24.9	51	0.6	154	1.7	512	5.6	3,940	43.5
(7/17-23)			F	0	0	460	5.1	819	9.0	0	0.0	3,480	38.4	103	1.1	51	0.6	204	2.3	5,118	56.5
			Subtotal	0	0	921	10.2	1,331	14.7	0	0.0	5,732	63.3	154	1.7	205	2.3	716	7.9	9,058	100.0
7/25-26	204	123	M	0	0	109	4.9	109	4.9	36	1.6	638	28.4	0	0.0	73	3.3	91	4.1	1,057	47.2
(7/24-28)			F	55	2.4	128	5.7	274	12.2	0	0.0	693	30.9	18	0.8	0	0.0	18	0.8	1,185	52.8
			Subtotal	55	2.4	237	10.6	383	17.1	36	1.6	1,331	59.3	18	0.8	73	3.3	109	4.9	2,242	100.0
7/30-8/2	134	87	M	0	0	46	2.3	92	4.6	0	0.0	553	27.6	23	1.2	0	0.0	0	0.0	714	35.6
(7/29-8/5)			F	0	0	161	8.0	254	12.6	23	1.1	761	37.9	23	1.1	23	1.1	46	2.3	1,291	64.4
			Subtotal	0	0	207	10.3	346	17.2	23	1.1	1,314	65.5	46	2.3	23	1.1	46	2.3	2,005	100.0
8/9-10	41	26	M	354	7.7	0	0.0	531	11.6	0	0.0	1,593	34.6	0	0.0	0	0.0	0	0.0	2,478	53.8
(8/6-9/18)			F	0	0	0	0.0	531	11.5	0	0.0	1,416	30.8	0	0.0	0	0.0	177	3.8	2,124	46.2
			Subtotal	354	7.7	0	0.0	1,062	23.1	0	0.0	3,009	65.4	0	0.0	0	0.0	177	3.8	4,602	100.0
Seasonal	1,041	727	M	354	0.5	3,161	4.4	3,710	5.2	36	0.1	24,647	34.1	415	0.6	1,750	2.4	1,966	2.7	36,039	49.9
			F	55	0.1	2,714	3.7	5,073	7.0	234	0.3	25,931	35.9	745	1.0	415	0.6	1,077	1.5	36,243	50.1
			Total	409	0.6	5,875	8.1	8,783	12.2	270	0.4	50,578	70.0	1,160	1.6	2,165	3.0	3,043	4.2	72,282	100.0
Grand		7,916	M	414	0.1	10,585	1.6	36,918	5.5	247	0.0	239,582	35.6	5,464	0.8	10,979	1.6	15,307	2.3	319,954	47.6
Total [a]			F	376	0.1	7,595	1.1	70,175	10.4	431	0.1	245,490	36.5	7,341	1.1	7,853	1.2	13,115	2.0	352,557	52.4
			Total	790	0.1	18,180	2.7	107,093	15.9	678	0.1	485,072	72.1	12,805	1.9	18,832	2.8	28,422	4.2	672,508	100.0

Note: The number of fish in each stratum category are derived from sample percentages; sum discrepancies are attributed to rounding errors. The number of fish in "Season" are the strata sums; "Season" percentages are derived from the sums.

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums and include years 1987, 1990, 1995, 1997, and 1999 through 2007. Minor age classes that were not present in 2007 samples are included in the "Grand Total" summation; however, those minor age classes are not presented in the Age Class columns.

Table 10.–Mean length (mm) of sockeye salmon escapement, Middle Fork Goodnews River weir, 2007.

Sample Dates			Age Class						
(Stratum Dates)	Sex		0.3	1.2	0.4	1.3	2.2	1.4	2.3
7/4,6-7	M	Mean Length	559	548		571	495	593	566
(6/25-7/7)		Std. Error	9	12		3	-	4	14
		Range	505- 600	515- 605		505- 625	495- 495	580- 605	530- 595
		Sample Size	9	8	0	61	1	6	4
	F	Mean Length	532	487	505	533	455	560	518
		Std. Error	4	10	-	3	-	-	11
		Range	520- 545	455- 535	505- 505	460- 565	455- 455	560- 560	505- 540
		Sample Size	5	9	1	59	1	1	3
7/12,15	M	Mean Length	551	495		570	512	597	567
(7/8-16)		Std. Error	17	12		3	-	12	19
		Range	502- 605	455- 530		528- 620	512- 512	585- 609	520- 610
		Sample Size	5	6	0	52	1	2	4
	F	Mean Length	519	487		532	462	500	
		Std. Error	7	7		3	7	-	
		Range	500- 550	458- 531		462- 601	453- 476	500- 500	
		Sample Size	7	10	0	55	3	1	0
7/19-21	M	Mean Length	564	550		578	569	573	572
(7/17-23)		Std. Error	6	12		5	-	11	7
		Range	535- 585	500- 625		485- 642	569- 569	555- 592	540- 611
		Sample Size	9	10	0	44	1	3	10
	F	Mean Length	548	514		538	469	601	541
		Std. Error	9	7		3	4	-	9
		Range	492- 587	475- 580		479- 582	465- 473	601- 601	525- 566
		Sample Size	9	16	0	68	2	1	4
7/25-26	M	Mean Length	567	550	576	591		594	566
(7/24-28)		Std. Error	14	15	14	5		8	11
		Range	522- 603	493- 603	561- 590	522- 680		574- 608	538- 603
		Sample Size	6	6	2	35	0	4	5
	F	Mean Length	551	525		551	493		561
		Std. Error	10	9		3	-		-
		Range	495- 586	461- 583		512- 592	493- 493		561- 561
		Sample Size	7	15	0	38	1	0	1
7/30-8/2	M	Mean Length	611	535		579	576		
(7/29-8/5)		Std. Error	11	17		5	-		
		Range	600- 622	500- 580		532- 637	576- 576		
		Sample Size	2	4	0	24	1	0	0
	F	Mean Length	547	522	580	542	460	535	522
		Std. Error	6	11	-	6	-	-	7
		Range	517- 572	470- 583	580- 580	480- 687	460- 460	535- 535	515- 528
		Sample Size	7	11	1	33	1	1	2

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Table 10.–Page 2 of 2

Sample Dates (Stratum Dates)	Sex		Age Class 0.3	1.2	0.4	1.3	2.2	1.4	2.3
8/9-10 (8/6-9/18)	M	Mean Length		563		581			
		Std. Error		12		9			
		Range		540- 576		535- 610			
		Sample Size	0	3	0	9	0	0	0
	F	Mean Length		533		538			517
		Std. Error		13		8			-
		Range		520- 560		485- 560			517- 517
		Sample Size	0	3	0	8	0	0	1
Season	M	Mean Length	564	540	576	576	538	589	569
		Range	502- 622	455- 625	561- 590	485- 680	495- 576	555- 609	520- 611
		Sample Size	31	37	2	225	4	15	23
	F	Mean Length	540	511	543	538	467	549	531
		Range	492- 587	455- 583	505- 580	460- 687	453- 493	500- 601	505- 566
		Sample Size	35	64	2	261	8	4	11
Grand Total [a]	M	Mean Length	578	529	579	579	537	601	575
		Range	568- 622	455- 625	465- 625	425- 630	495- 645	470- 700	499- 611
		Sample Size	73	479	6	2731	74	129	182
	F	Mean Length	544	495	566	544	490	553	533
		Range	470- 595	429- 597	490- 595	415- 687	453- 595	438- 635	450- 566
		Sample Size	77	985	6	2784	129	97	137

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1987, 1990, 1995, 1997, and 1999–2007.

Table 11.–Age and sex composition of chum salmon escapement, Middle Fork Goodnews River weir.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Esc.	0.2 %	0.3 Esc.	0.3 %	0.4 Esc.	0.4 %	0.5 Esc.	0.5 %	Total Esc.	Total %
7/4,6-8,10	118	112	M	0	0.0	1,476	25.9	1,679	29.5	0	0.0	3,155	55.4
(6/25-7/10)			F	0	0.0	1,272	22.3	1,221	21.4	51	0.9	2,544	44.6
			Subtotal	0	0.0	2,748	48.2	2,900	50.9	51	0.9	5,699	100.0
7/12,15	210	145	M	0	0.0	1,743	22.0	2,887	36.6	109	1.4	4,739	60.0
(7/11-17)			F	54	0.7	1,689	21.4	1,417	17.9	0	0.0	3,160	40.0
			Subtotal	54	0.7	3,432	43.4	4,304	54.5	109	1.4	7,899	100.0
7/19-20	190	176	M	0	0.0	2,353	23.3	2,296	22.7	115	1.1	4,764	47.2
(7/18-22)			F	0	0.0	2,927	29.0	2,410	23.9	0	0.0	5,337	52.8
			Subtotal	0	0.0	5,280	52.3	4,706	46.6	115	1.1	10,101	100.0
7/25	210	192	M	0	0.0	2,849	29.7	1,350	14.1	0	0.0	4,198	43.8
(7/23-27)			F	100	1.0	3,049	31.8	2,199	22.9	50	0.5	5,398	56.2
			Subtotal	100	1.0	5,898	61.5	3,549	37.0	50	0.5	9,596	100.0
7/30	205	180	M	0	0.0	1,882	23.3	1,389	17.2	0	0.0	3,271	40.6
(7/28-8/4)			F	0	0.0	3,047	37.8	1,748	21.7	0	0.0	4,795	59.4
			Subtotal	0	0.0	4,929	61.1	3,137	38.9	0	0.0	8,066	100.0
8/9-11	69	60	M	0	0.0	1,717	21.7	2,113	26.7	0	0.0	3,830	48.3
(8/5-9/18)			F	264	3.3	2,641	33.3	1,057	13.3	132	1.7	4,094	51.7
			Subtotal	264	3.3	4,358	55.0	3,170	40.0	132	1.7	7,924	100.0
Season	1,002	865	M	0	0.0	12,020	24.4	11,714	23.8	224	0.4	23,957	48.6
			F	419	0.8	14,625	29.7	10,051	20.4	233	0.5	25,328	51.4
			Total	419	0.8	26,645	54.1	21,765	44.2	457	0.9	49,285	100.0
Grand Total [a]		8,635	M	5,400	2.1	85,348	32.5	48,318	18.4	2,342	0.9	141,404	53.9
			F	6,738	2.6	80,073	30.5	32,792	12.5	1,315	0.5	120,929	46.1
			Total	12,139	4.6	165,422	63.1	81,110	30.9	3,656	1.4	262,333	100.0

Note: The number of fish in each stratum category are derived from sample percentages; sum discrepancies are attributed to rounding errors. The number of fish in "Season" are the strata sums; "Season" percentages are derived from the sums.

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1990 through 1991, 1997 through 1999, and 2001–2007.

Table 12.–Mean length (mm) of chum salmon escapement through the Middle Fork Goodnews.

Sample Dates			Age Class			
(Stratum Dates)	Sex		0.2	0.3	0.4	0.5
7/4,6-8,10	M	Mean Length		585	607	
(6/25-7/10)		Std. Error		5	6	
		Range		515- 635	540- 675	
		Sample Size	0	29	33	0
	F	Mean Length		572	554	600
		Std. Error		3	6	-
		Range		545- 605	460- 600	600- 600
		Sample Size	0	25	24	1
7/12,15	M	Mean Length		577	596	595
(7/11-17)		Std. Error		6	4	33
		Range		516- 639	530- 651	562- 628
		Sample Size	0	32	53	2
	F	Mean Length	558	564	554	
		Std. Error	-	6	5	
		Range	558- 558	443- 612	503- 595	
		Sample Size	1	31	26	0
7/19-20	M	Mean Length		592	608	595
(7/18-22)		Std. Error		6	5	13
		Range		502- 665	554- 683	582- 607
		Sample Size	0	40	40	2
	F	Mean Length		558	568	
		Std. Error		4	5	
		Range		482- 610	497- 640	
		Sample Size	0	51	42	0
7/25	M	Mean Length		561	580	
(7/23-27)		Std. Error		4	6	
		Range		499- 631	518- 645	
		Sample Size	0	57	27	0
	F	Mean Length	552	539	549	518
		Std. Error	1	3	4	
		Range	550- 553	489- 579	488- 613	518- 518
		Sample Size	2	61	44	1
7/30	M	Mean Length		578	590	
(7/28-8/4)		Std. Error		4	5	
		Range		515- 633	516- 652	
		Sample Size	0	42	31	0
	F	Mean Length		551	559	
		Std. Error		3	4	
		Range		511- 627	488- 607	
		Sample Size	0	68	39	0

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Table 12.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
8/9-11 (8/5-9/18)	M	Mean Length		585	584	
		Std. Error		10	10	
		Range		515- 640	505- 655	
		Sample Size	0	13	16	0
	F	Mean Length	525	553	540	545
		Std. Error	10	5	10	-
		Range	515- 535	505- 600	500- 595	545- 545
		Sample Size	2	20	8	1
Season	M	Mean Length		578	595	595
		Range		499- 665	505- 683	562- 628
		Sample Size	0	213	200	4
	F	Mean Length	536	554	556	551
		Range	515- 558	443- 627	460- 640	518- 600
		Sample Size	5	256	183	3
Grand Total [a]	M	Mean Length	552	589	611	625
		Range	495- 585	480- 685	515- 710	605- 640
		Sample Size	47	2390	1410	33
	F	Mean Length	534	557	574	580
		Range	510- 560	475- 640	470- 675	640- 645
		Sample Size	96	2725	1247	11

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1990 through 1991, 1997 through 1999, and 2001–2007.

Table 13.–Age and sex composition of coho salmon escapement, Middle Fork Goodnews River weir, 2007.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Esc.	1.1 %	2.1 Esc.	2.1 %	3.1 Esc.	3.1 %	Total Esc.	Total %
8/10-11,13-15	144	112	M	219	12.5	926	52.7	47	2.7	1,192	67.9
(6/15-8/17)			F	16	0.9	549	31.2	0	0.0	565	32.1
			Subtotal	235	13.4	1,475	83.9	47	2.7	1,757	100.0
8/20-21	130	96	M	492	10.4	1,966	41.7	49	1.0	2,508	53.1
(8/18-25)			F	344	7.3	1,672	35.4	197	4.2	2,212	46.9
			Subtotal	836	17.7	3,638	77.1	246	5.2	4,720	100.0
8/30-31	170	123	M	402	6.5	1,911	30.9	201	3.3	2,515	40.7
(8/26-9/3)			F	302	4.9	3,219	52.0	151	2.4	3,671	59.3
			Subtotal	704	11.4	5,130	82.9	352	5.7	6,186	100.0
9/7-8	170	132	M	378	4.5	3,149	37.9	252	3.0	3,778	45.5
(9/4-18)			F	504	6.1	4,030	48.5	0	0.0	4,534	54.5
			Subtotal	882	10.6	7,179	86.4	252	3.0	8,312	100.0
Season	614	463	M	1,492	7.1	7,952	37.9	549	2.6	9,993	47.6
			F	1,165	5.6	9,469	45.2	348	1.7	10,982	52.4
			Subtotal	2,657	12.7	17,421	83.1	897	4.3	20,975	100.0
Grand		3,805	M	11,382	4.4	113,026	44	5,249	2.0	129,657	50.8
Total [a]			F	9,368	3.6	114,157	44	5,533	2.1	129,057	49.2
			Total	20,750	8.0	227,003	88	10,782	4.2	258,714	100.0

Note: The number of fish in each stratum category are derived from sample percentages; sum discrepancies are attributed to rounding errors.

[a] The number of fish in "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1998–2004, and 2007.

Table 14.–Mean length (mm) of coho salmon escapement, Middle Fork Goodnews River weir, 2007.

Sample Dates (stratum Dates)	Sex		Age Class 1.1	2.1	3.1
8/10-11,13-15	M	Mean Length	536	549	558
(6/15-8/17)		Std. Error	13	7	17
		Range	455- 610	440- 640	525- 575
		Sample Size	14	59	3
	F	Mean Length	570	582	
		Std. Error	-	6	
		Range	570- 570	470- 640	
		Sample Size	1	35	0
8/20-21	M	Mean Length	550	584	615
(8/18-25)		Std. Error	13	8	-
		Range	480- 600	405- 695	615- 615
		Sample Size	10	40	1
	F	Mean Length	582	590	589
		Std. Error	9	6	22
		Range	555- 615	510- 635	525- 615
		Sample Size	7	34	4
8/30-31	M	Mean Length	567	588	492
(8/26-9/3)		Std. Error	19	8	46
		Range	486- 626	450- 660	360- 573
		Sample Size	8	38	4
	F	Mean Length	563	587	594
		Std. Error	16	4	5
		Range	497- 609	518- 652	589- 603
		Sample Size	6	64	3
9/7-8	M	Mean Length	593	576	584
(9/4-18)		Std. Error	13	6	18
		Range	540- 622	474- 695	559- 638
		Sample Size	6	50	4
	F	Mean Length	592	596	
		Std. Error	4	3	
		Range	566- 605	507- 649	
		Sample Size	8	64	0
Season	M	Mean Length	563	578	551
		Range	455- 626	405- 695	360- 638
		Sample Size	38	187	12
	F	Mean Length	581	591	591
		Range	497- 615	470- 652	525- 615
		Sample Size	22	197	7

-continued-

Table 14.–Page 2 of 2.

Sample Dates (stratum Dates)	Sex		Age Class 1.1	2.1	3.1
Grand Total [a]	M	Mean Length	560	583	587
		Range	455- 658	405- 707	360- 675
		Sample Size	169	1,737	76
	F	Mean Length	584	590	588
		Range	497- 677	400- 680	420- 625
		Sample Size	117	1,638	68

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1998–2004, and 2007.

Table 15.–District W-5 Commercial Harvest by period and exvessel value, 2007.

Date	Permits	Chinook		Sockeye		Chum		Coho	
Caught	Fished	Harvest	Pounds	Harvest	Pounds	Harvest	Pounds	Harvest	Pounds
19-Jun	13	324	3,908	426	3,104	322	2,371	0	0
21-Jun	16	362	4,678	936	6,709	480	3,667	0	0
25-Jun	21	647	8,182	2,818	20,319	674	5,190	0	0
27-Jun	20	506	7,023	2,888	20,506	944	7,205	0	0
29-Jun	20	312	3,889	2,224	16,151	201	1,492	0	0
2-Jul	18	144	2,280	2,500	18,327	52	386	0	0
4-Jul	16	63	981	1,940	14,071	312	2,404	0	0
6-Jul	19	112	1,809	2,338	17,104	312	2,478	0	0
8-Jul	20	93	1,560	3,012	21,653	345	2,641	0	0
10-Jul	18	108	1,846	2,895	20,938	356	2,595	1	6
12-Jul	19	59	1,015	2,911	20,749	289	2,143	2	13
14-Jul	18	96	1,561	3,022	21,492	239	1,743	3	20
16-Jul	18	61	1,069	2,359	16,735	447	3,188	4	29
18-Jul	18	33	538	2,070	14,866	381	2,693	9	64
20-Jul	16	46	806	1,685	11,997	599	4,314	24	161
24-Jul	16	44	740	1,704	12,228	443	3,202	133	993
26-Jul	18	22	373	1,874	13,391	448	3,222	217	1,596
31-Jul	16	19	275	806	5,708	222	1,646	419	3,265
2-Aug	13	8	131	340	2,438	98	666	296	2,280
6-Aug	12	9	130	371	2,557	95	615	852	6,929
8-Aug	15	21	383	586	4,174	78	533	1,129	9,213
10-Aug	16	6	94	686	4,893	40	265	1,686	13,686
13-Aug	15	3	50	401	2,806	24	153	1,161	9,615
17-Aug	15	2	42	334	2,471	21	147	1,269	10,997
20-Aug	14	4	85	506	3,518	16	111	1,246	10,704
22-Aug	15	3	53	438	3,121	14	96	1,221	10,504
24-Aug	14	1	15	509	3,621	9	58	1,643	14,437
27-Aug	15	3	23	523	3686	21	142	1102	9531
29-Aug	12	1	7	354	2,566	23	159	797	7,040
31-Aug	12	0	0	260	1,832	14	85	475	4,160
Total	28	3,112	43,546	43,716	313,731	7,519	55,610	13,689	115,243
Avg. Wt.		14.0		7.2		7.4		8.4	
Avg. Price		$0.55		$0.50		$0.05		$0.35	
Total Exvessel Value		$23,950		$156,866		$2,781		$40,335	

Total Fish	68,036
Total Pounds	528,130
Total Exvessel Value	$223,931

Table 16.–Age and sex composition of Chinook salmon harvest, District W-5 commercial fishery, 2007.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Catch	1.1 %	1.2 Catch	1.2 %	1.3 Catch	1.3 %	1.4 Catch	1.4 %	2.3 Catch	2.3 %	1.5 Catch	1.5 %	2.4 Catch	2.4 %	Total Catch	Total %
6/21	54	42	M	0	0.0	343	50.0	98	14.3	114	16.7	0	0	0	0.0	0	0.0	555	81.0
(6/19-21)			F	0	0.0	0	0.0	0	0.0	131	19.0	0	0	0	0.0	0	0.0	131	19.0
			Subtotal	0	0.0	343	50.0	98	14.3	245	35.7	0	0	0	0.0	0	0.0	686	100.0
6/27,29	191	164	M	0	0.0	634	43.3	286	19.5	143	9.7	9	0.6	9	0.6	54	3.7	1,134	77.4
(6/25,27,29)			F	0	0.0	18	1.2	62	4.3	241	16.5	0	0	0	0.0	9	0.6	331	22.6
			Subtotal	0	0.0	652	44.5	348	23.8	384	26.2	9	0.6	9	0.6	63	4.3	1,465	100.0
7/3	139	107	M	0	0.0	127	30.8	70	16.8	54	13.1	0	0	0	0.0	4	1.0	254	61.7
(7/2,4,6,8)			F	0	0.0	0	0.0	19	4.7	131	31.8	0	0	4	0.9	4	0.9	158	38.3
			Subtotal	0	0.0	127	30.8	89	21.5	185	44.9	0	0	4	0.9	8	1.9	412	100.0
7/10	72	56	M	0	0.0	118	21.4	98	17.9	88	16.1	10	1.8	0	0.0	0	0.0	314	57.1
(7/10-8/29)			F	0	0.0	0	0.0	49	8.9	187	33.9	0	0	0	0.0	0	0.0	235	42.9
			Subtotal	0	0.0	118	21.4	147	26.8	275	50.0	10	1.8	0	0.0	0	0.0	549	100.0
Season	456	369	M	0	0.0	1,222	39.2	551	17.7	399	12.8	19	0.6	9	0.3	57	1.9	2,258	72.5
			F	0	0.0	18	0.6	131	4.2	689	22.2	0	0	4	0.1	13	0.4	854	27.5
			Subtotal	0	0.0	1,240	39.8	682	21.9	1,088	35.0	19	0.6	13	0.4	70	2.3	3,112	100.0
Grand		2,075	M	107	0.4	6,184	23.63	6,312	24.12	2,599	9.9	19	0.1	158	0.6	57	0.2	15,481	59.1
Total [a]			F	0	0	481	1.837	4,539	17.35	5,312	20.3	0	0	280	1.1	72	0.3	10,687	40.8
			Total	107	0.3	6,665	25.47	10,851	41.47	7,912	30.2	19	0.1	438	1.7	129	0.5	26,167	100.0

Note: The number of fish in each stratum age and sex category are derived from the sample percentages; discrepancies are attributed to rounding errors.

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums.

Table 17.–Mean length (mm) of Chinook salmon harvest, District W-5 commercial fishery, 2007.

Sample Dates			Age Class						
(Stratum Dates)	Sex		1.1	1.2	1.3	1.4	2.3	1.5	2.4
6/21	M	Mean Length		533	679	864			
(6/19-21)		Std. Error		10	22	36			
		Range		450- 625	581- 739	760- 974			
		Sample Size	0	21	6	6	0	0	0
	F	Mean Length				876			
		Std. Error				7			
		Range				842- 895			
		Sample Size	0	0	0	8	0	0	0
6/27,29	M	Mean Length		555	682	808	755	865	842
(6/25,27,29)		Std. Error		5	9	20	-	-	26
		Range		455- 705	565- 787	680- 932	755- 755	865- 865	790- 962
		Sample Size	0	71	31	16	1	1	6
	F	Mean Length		571	762	839			878
		Std. Error		14	18	13			-
		Range		557- 584	706- 818	708- 990			878- 878
		Sample Size	0	2	7	27	0	0	1
7/3	M	Mean Length		546	664	803			856
(7/2,4,6,8)		Std. Error		9	12	31			-
		Range		467- 674	550- 732	570-1,015			856- 856
		Sample Size	0	33	18	14	0	0	1
	F	Mean Length			710	833		1,042	813
		Std. Error			42	11		-	-
		Range			568- 820	730-1,012		1,042-1,042	813- 813
		Sample Size	0	0	5	34	0	1	1
7/10	M	Mean Length		551	707	838	690		
(7/10-8/29)		Std. Error		23	19	17	-		
		Range		454- 774	620- 787	753- 933	690- 690		
		Sample Size	0	12	10	9	1	0	0
	F	Mean Length			793	808			
		Std. Error			23	13			
		Range			724- 866	700- 900			
		Sample Size	0	0	5	19	0	0	0
Season	M	Mean Length		547	684	830	721	865	843
		Range		450- 774	550- 787	570-1,015	690- 755	865- 865	790- 962
		Sample Size	0	137	65	45	2	1	7
	F	Mean Length		571	766	836		1,042	858
		Range		557- 584	568- 866	700-1,012		1,042-1,042	813- 878
		Sample Size	0	2	17	88	0	1	2

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Table 17.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	1.3	1.4	2.3	1.5	2.4
Grand Total [a]	M	Mean Length	404	542	693	836	721	905	843
		Range	325- 464	450- 774	539- 876	570-1,030	690- 755	865-1,000	790- 962
		Sample Size	10	574	507	212	2	9	7
	F	Mean Length		619	761	851		908	858
		Range		505- 650	568- 995	620- 1,012		819- 1,042	813- 878
		Sample Size	0	14	211	449	0	16	2

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths.

Table 18.–Age and sex composition of sockeye salmon harvest, District W-5 commercial fishery, 2007.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.3 Catch	%	1.2 Catch	%	0.4 Catch	%	1.3 Catch	%	2.2 Catch	%	1.4 Catch	%	2.3 Catch	%	Total Catch	%
6/21	89	72	M	294	4.2	98	1.4	0	0	3,730	52.8	0	0.0	98	1.4	491	6.9	4,712	66.7
(6/19,21,25,27)			F	0	0	0	0.0	0	0	2,062	29.1	0	0.0	0	0.0	294	4.2	2,356	33.3
			Subtotal	294	4.2	98	1.4	0	0	5,792	81.9	0	0.0	98	1.4	785	11.1	7,068	100.0
7/4	210	183	M	66	0.6	591	4.9	0	0	4,990	41.5	131	1.1	132	1.1	525	4.4	6,434	53.6
(6/29,7/2,4,6,8)			F	197	1.6	131	1.1	0	0	4,267	35.5	0	0.0	328	2.7	657	5.4	5,580	46.4
			Subtotal	263	2.2	722	6.0	0	0	9,257	77.0	131	1.1	460	3.8	1,182	9.8	12,014	100.0
7/12	107	84	M	526	5.9	631	7.1	0	0	4,414	50.0	105	1.2	210	2.4	526	5.9	6,411	72.6
(7/10,12,14)			F	105	1.2	210	2.4	0	0	1,787	20.2	105	1.2	105	1.2	105	1.2	2,417	27.4
			Subtotal	631	7.1	841	9.5	0	0	6,201	70.2	210	2.4	315	3.6	631	7.1	8,828	100.0
7/16	200	155	M	91	3.9	167	7.1	0	0	928	39.4	30	1.3	61	2.6	152	6.5	1,431	60.6
(7/16)			F	46	1.9	61	2.6	15	0.6	685	29.0	0	0.0	46	1.9	76	3.2	928	39.4
			Subtotal	137	5.8	228	9.7	15	0.6	1,613	68.4	30	1.3	107	4.5	228	9.7	2,359	100.0
7/18	192	151	M	50	1.3	298	8.0	0	0	1,318	35.1	124	3.3	99	2.6	224	6.0	2,114	56.3
(7/18,20)			F	149	4	249	6.6	0	0	1,044	27.8	50	1.3	25	0.7	124	3.3	1,641	43.7
			Subtotal	199	5.3	547	14.6	0	0	2,362	62.9	174	4.6	124	3.3	348	9.3	3,755	100.0
7/24	210	60	M	0	0	1,292	13.3	0	0	3,715	38.4	162	1.7	485	5.0	485	5.0	6,138	63.3
(7/24-8/31)			F	323	3.3	646	6.7	0	0	2,262	23.3	161	1.6	0	0.0	161	1.7	3,554	36.7
			Subtotal	323	3.3	1,938	20.0	0	0	5,977	61.7	323	3.3	485	5.0	646	6.7	9,692	100.0
Season	1,008	705	M	1,027	2.3	3,078	7.0	0	0.0	19,096	43.7	553	1.3	1,084	2.5	2,402	5.5	27,239	62.3
			F	820	1.9	1,297	3.0	15	0.0	12,106	27.7	316	0.7	504	1.1	1,418	3.2	16,477	37.7
			Subtotal	1,847	4.2	4,375	10.0	15	0.0	31,202	71.4	869	2.0	1,588	3.6	3,820	8.7	43,716	100.0
Grand		10,068	M	9,603	1.7	39,427	6.8	1,041	0.2	226,105	39.3	9,519	1.7	7,688	1.3	24,655	4.3	320,283	55.6
Total [a]			F	9,149	1.6	25,223	4.4	1,278	0.2	191,579	33.3	5,793	1.0	5,459	0.9	16,057	2.8	255,565	44.4
			Total	18,752	3.3	64,650	11.2	2,319	0.4	417,685	72.5	15,312	2.7	13,147	2.3	40,712	7.1	575,848	100.0

Note: The numbers of fish in each stratum age and sex category are derived from the sample percentages; discrepancies are attributed to rounding errors. Minor age classes present in the historical data, but not observed in the 2007 harvest are not presented in the "Grand Total".

[a] The numbers of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums.

Table 19.–Mean length (mm) of sockeye salmon harvest, District W-5 commercial fishery, 2007.

Sample Dates			Age Class						
(Stratum Dates)	Sex		0.3	1.2	0.4	1.3	2.2	1.4	2.3
6/21	M	Mean Length	586	460		584		590	588
(6/19,21,25,27)		Std. Error	8	-		3		-	6
		Range	574- 600	460- 460		528- 614		590- 590	568- 600
		Sample Size	3	1	0	38	0	1	5
	F	Mean Length				552			570
		Std. Error				3			10
		Range				524- 584			549- 580
		Sample Size	0	0	0	21	0	0	3
7/4	M	Mean Length	620	511		564	537	583	566
(6/29,7/2,4,6,8)		Std. Error	-	9		3	25	17	6
		Range	620- 620	448- 550		492- 619	512- 562	566- 599	532- 592
		Sample Size	1	9	0	76	2	2	8
	F	Mean Length	540	477		539		541	534
		Std. Error	6	2		2		10	4
		Range	533- 553	475- 479		507- 585		500- 556	517- 562
		Sample Size	3	2	0	65	0	5	10
7/12	M	Mean Length	548	499		555	485	560	562
(7/10,12,14)		Std. Error	10	8		3	-	22	8
		Range	518- 575	480- 532		522- 598	485- 485	538- 581	544- 590
		Sample Size	5	6	0	42	1	2	5
	F	Mean Length	527	490		531	512	542	562
		Std. Error	-	17		4	-	-	-
		Range	527- 527	473- 507		495- 565	512- 512	542- 542	562- 562
		Sample Size	1	2	0	17	1	1	1
7/16	M	Mean Length	553	525		564	528	572	571
(7/16)		Std. Error	7	10		3	11	15	6
		Range	530- 579	484- 575		517- 628	517- 539	539- 606	545- 606
		Sample Size	6	11	0	61	2	4	10
	F	Mean Length	529	497	530	536		554	542
		Std. Error	10	14	-	3		4	11
		Range	510- 540	465- 530	530- 530	500- 602		545- 560	520- 578
		Sample Size	3	4	1	45	0	3	5
7/18	M	Mean Length	545	528		555	540	570	565
(7/18,20)		Std. Error	7	10		3	12	11	10
		Range	538- 552	485- 582		490- 590	506- 572	547- 600	515- 613
		Sample Size	2	12	0	53	5	4	9
	F	Mean Length	525	519		533	507	575	536
		Std. Error	9	13		3	28	-	6
		Range	493- 555	466- 583		490- 564	479- 534	575- 575	514- 548
		Sample Size	6	10	0	42	2	1	5

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Table 19.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 0.3	1.2	0.4	1.3	2.2	1.4	2.3
7/24	M	Mean Length		522		555	525	569	588
(7/24-8/31)		Std. Error		10		5	-	11	12
		Range		483- 570		498- 600	525- 525	553- 590	566- 607
		Sample Size	0	8	0	23	1	3	3
	F	Mean Length	529	514		534	505		547
		Std. Error	6	21		4	-		-
		Range	523- 534	460- 558		505- 555	505- 505		547- 547
		Sample Size	2	4	0	14	1	0	1
Season	M	Mean Length	564	514		563	524	571	574
		Range	518- 620	448- 582		490- 628	485- 572	538- 606	515- 613
		Sample Size	17	47	0	293	11	16	40
	F	Mean Length	531	507	530	538	508	544	545
		Range	493- 555	460- 583	530- 530	490- 602	479- 534	500- 575	514- 580
		Sample Size	15	22	1	204	4	10	25
Grand	M	Mean Length	583	540	598	589	556	599	591
Total [a]		Range	488- 660	390- 678	541- 640	440- 683	427- 643	538- 700	500- 655
		Sample Size	122	689	42	3815	160	136	377
	F	Mean Length	550	517	568	558	518	569	559
		Range	490- 610	350- 611	530- 610	440- 695	452- 565	500- 690	482- 613
		Sample Size	109	474	26	3176	86	121	257

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths.

Table 20.–Age and sex composition of chum salmon harvest from the District W-5 commercial fishery, 2007.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Catch	0.2 %	0.3 Catch	0.3 %	0.4 Catch	0.4 %	0.5 Catch	0.5 %	Total Catch	Total %
6/21	100	92	M	0	0.0	842	34.8	815	33.7	53	2.2	1,710	70.7
(6/19,21,25,27)			F	0	0.0	210	8.7	500	20.6	0	0.0	710	29.3
			Subtotal	0	0.0	1,052	43.5	1,315	54.3	53	2.2	2,420	100.0
7/4	200	188	M	0	0.0	416	34.0	410	33.5	7	0.6	832	68.1
(6/29,7/2,4,6,8)			F	0	0.0	176	14.4	208	17.0	6	0.5	390	31.9
			Subtotal	0	0.0	592	48.4	618	50.5	13	1.1	1,222	100.0
712	176	151	M	0	0.0	293	33.1	164	18.5	12	1.3	468	53.0
(7/10,12,14)			F	0	0.0	246	27.8	170	19.2	0	0.0	416	47.0
			Subtotal	0	0.0	539	60.9	334	37.7	12	1.3	884	100.0
7/18	120	112	M	0	0.0	695	23.2	481	16.1	0	0.0	1,176	39.3
(7/16-8/31)			F	27	0.9	1,069	35.7	722	24.1	0	0.0	1,817	60.7
			Subtotal	27	0.9	1,764	58.9	1,203	40.2	0	0.0	2,993	100.0
Season	596	543	M	0	0.0	2,245	29.9	1,870	24.9	71	0.9	4,186	55.7
			F	27	0.4	1,701	22.6	1,599	21.2	6	0.1	3,333	44.3
			Subtotal	27	0.4	3,946	52.5	3,469	46.1	77	1.0	7,519	100.0
Grand		7,184	M	470	0.2	50,102	26.4	41,514	21.9	1,133	0.6	93,216	49.1
Total [a]			F	276	0.1	48,683	25.7	46,908	24.7	696	0.4	96,563	50.9
			Total	747	0.4	98,785	52.1	88,423	46.6	1,829	1.0	189,774	100.0

Note: The numbers of fish in each stratum age and sex category are derived from the sample percentages; discrepancies are attributed to rounding errors.

[a] The numbers of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums.

Table 21.–Mean length (mm) of chum salmon harvest, the District W-5 commercial fishery, 2007.

Sample Dates			Age Class			
(Stratum Dates)	Sex		0.2	0.3	0.4	0.5
6/21	M	Mean Length		583	592	595
(6/19,21,25,27)		Std. Error		5	6	16
		Range		532- 634	543- 677	579- 611
		Sample Size	0	32	31	2
	F	Mean Length		561	573	
		Std. Error		6	7	
		Range		539- 591	520- 621	
		Sample Size	0	8	19	0
7/4	M	Mean Length		580	585	571
(6/29,7/2,4,6,8)		Std. Error		4	4	-
		Range		517- 645	532- 662	571- 571
		Sample Size	0	64	63	1
	F	Mean Length		562	565	580
		Std. Error		5	4	-
		Range		531- 620	515- 615	580- 580
		Sample Size	0	27	32	1
712	M	Mean Length		557	564	585
(7/10,12,14)		Std. Error		4	5	13
		Range		511- 611	509- 636	572- 598
		Sample Size	0	50	28	2
	F	Mean Length		532	543	
		Std. Error		4	5	
		Range		483- 593	507- 605	
		Sample Size	0	42	29	0
7/18	M	Mean Length		551	564	
(7/16-8/31)		Std. Error		4	5	
		Range		495- 587	525- 593	
		Sample Size	0	26	18	0
	F	Mean Length	536	536	537	
		Std. Error	-	3	5	
		Range	536- 536	503- 580	495- 603	
		Sample Size	1	40	27	0
Season	M	Mean Length		569	581	591
		Range		495- 645	509- 677	571- 611
		Sample Size	0	172	140	5
	F	Mean Length	536	541	553	580
		Range	536- 536	483- 620	495- 621	580- 580
		Sample Size	1	117	107	1

-continued-

Table 21.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
Grand Total [a]	M	Mean Length	540	588	608	618
		Range	515- 593	488- 704	498- 725	560- 703
		Sample Size	21	1992	1415	31
	F	Mean Length	545	565	580	602
		Range	522- 568	430- 700	491- 680	565- 658
		Sample Size	11	2075	1604	26

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths.

Table 22.–Daily weather and hydrological observations, Middle Fork Goodnews River weir site, 2007.

Date	Wind (Dir./Speed)	Precipitation mm/24hr	Air Temp. °C	Water Temp °C	Cloud Cover %/altitude	Water Level (cm)
6/22	SW/1	0.2	8	9	100/	NA
6/23	W/7.6	0.5	14	9	90/	NA
6/24	W/5.5	0.0	8	10	100/	NA
6/25	SE/6.0	0.0	13	9	100/2,000	NA
6/26	0	0.0	7	7	100/1,200	NA
6/27	SE/5	0.0	8	11	100/4,000	NA
6/28	0	0.2	7	7	100/1,000	NA
6/29	W/2	0.6	8	9	100/1,000	50.0
6/30	SW/5	0.0	9	9	100/1,000	52.0
7/01	0	0.1	9	NA	100/1,500	52.0
7/02	0	0.5	9	9	100/2,000	49.5
7/03	0	0.0	11	11	95/2,500	49.8
7/04	SW/2	1.2	10	12	100/FOG	49.8
7/05	0	0.5	9	11	100/1,000	52.5
7/06	0	1.2	8	13	100/FOG	50.0
7/07	0	0.0	11	10	95/1,200	50.0
7/08	0	6.0	11	13	100/1,000	47.0
7/09	0	0.5	9	13	95/1,200	46.0
7/10	0	0.0	8	12	100/FOG	46.0
7/11	0	0.0	6	12	100/FOG	45.0
7/12	0	0.0	10	14	100/500	43.0
7/13	0	15.0	NA	10	100/1,000	50.0
7/14	0	2.5	9	9	100/1,300	51.0
7/15	SW/3	2.0	9	10	100/700	49.0
7/16	0	0.0	8	10	95/1,000	47.0
7/17	0	0.0	11	10	100/3,000	46.0
7/18	0	0.0	NA	NA	NA	NA
7/19	0	0.0	NA	NA	NA	NA
7/20	0	0.0	NA	NA	NA	NA
7/21	SE/5	1.6	9	13	100/800	40.0
7/22	SE/3	3.9	10	9	100/800	40.0
7/23	SE/3	0.3	8	11	95/1,000	41.0
7/24	0	4.0	8	9	100/800	44.0
7/25	0	11.5	7	10	90/2,500	46.5
7/26	0	0.0	NA	12	90/2,500	41.0
7/27	0	0.0	8	13	10/	40.0
7/28	W/5	0.0	11	13	100/900	38.0
7/29	NW/5	0.0	14	12	90/2,300	37.0
7/30	W/3	0.0	11	13	100/2,000	36.0
7/31	SE/3	0.0	9	11	100/800	35.0
8/01	SE/10	0.5	10	11	100/800	35.0
8/02	SE/5	7.4	11.0	11.0	100/500	38.0
8/03	SE/3	1.4	10.0	10.0	100/1,000	54.0
8/04	0	7.5	10	10	100/500	58.0
8/05	SW5	13.5	11	10	0/0	65.0
8/06	0	0.0	11	10	90/1,500	69.0
8/07	0	0.0	8	10	30/500	68.0

-continued-

Table 22.–Page 2 of 2.

Date	Wind (Dir./Speed)	Precipitation mm/24hr	Air Temp. °C	Water Temp °C	Cloud Cover %/altitude	Water Level (cm)
8/08	0	0.0	8	10	100/FOG	66.0
8/09	0	0.0	10	10	100/FOG	61.0
8/10	0	0.0	7	10	100/FOG	58.0
8/11	SE/5	0.7	14	13	100/800	54.0
8/12	SE/5	1.8	18	11	100/1,000	53.0
8/13	S/5	0.2	14	13	90/1,200	50.0
8/14	SW/3	5.4	9.5	10.75	100/800	50.0
8/15	0	5.2	5	12	0	52.5
8/16	0	0.0	1	10	100/50	48.0
8/17	SE/5	0.0	9	11.25	30/	46.0
8/18	W/5	0	11.5	12	100/2,300	44.0
8/19	W/5	5.2	11	10	100/2,300	46.0
8/20	0	3.2	7.5	10.5	95/1,700	50.0
8/21	E/5	6.5	9	10.5	100/800	53.0
8/22	0	8.0	9	11	100/1,500	50.0
8/23	0	0.0	7	11	90/2,000	52.0
8/24	W/10	0.5	10	11	0	51.0
8/25	0	0.0	11.5	10.5	0	50.0
8/26	0	0.0	15.5	10.5	70/2,500	47.0
8/27	0	0.0	8	10	90/2,500	46.0
8/28	E/5	1.4	17	10.5	10/	44.0
8/29	NW/5	0.0	16	11	0	44.0
8/30	NW/5	0.0	11.5	9.5	60/2,300	42.0
8/31	0	0.0	7	9	5/500	41.0
9/01	0	0.0	12.75	10	0	40.0
9/02	0	0.0	9	9.5	100/FOG	38.0
9/03	NE/10	7.8	9.5	9.5	100/1,750	38.0
9/04	W/5	0.8	6	9.25	90/3,000	45.0
9/05	0	0.0	10.5	9.5	90/2,300	42.0
9/06	0	0.0	10	9.5	100/1,000	40.0
9/07	SE/5	4.0	9	8.75	100/100	39.0
9/08	SE/5	8.5	11.25	10	100/700	41.0
9/09	SE/5	8.0	9.5	9.5	100/800	49.0
9/10	E/5	0.0	9.5	9	100/2,000	51.0
9/11	S/30	40.2	10.5	9.5	100/800	55.0
9/12	S/5	12.0	8.5	8.5	100/800	N/A
9/13	SE/5	5.2	8	8	100/800	N/A
9/14	E/5	0.1	6	7.5	100/1,000	N/A
9/15	0	8.0	7	7	100/1,500	N/A
9/16	0	12.8	7.5	8	50/2,300	N/A
9/17	SE/5	10.0	8	7.75	100/1,500	N/A
9/18	SE/30	37.0	10	8.5	100/FOG	N/A

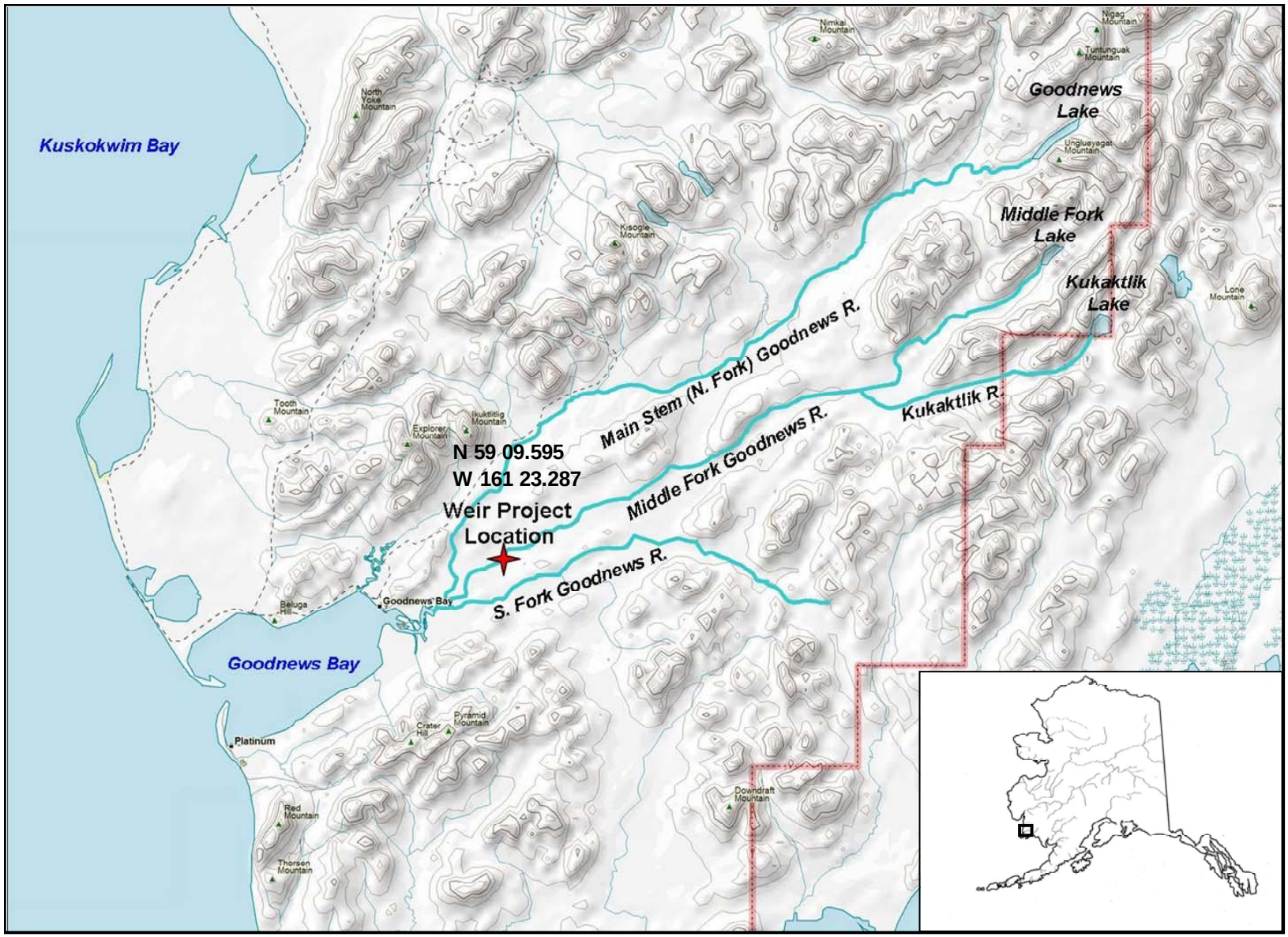


Figure 1.–Goodnews River drainage, Kuskokwim Bay, Alaska.

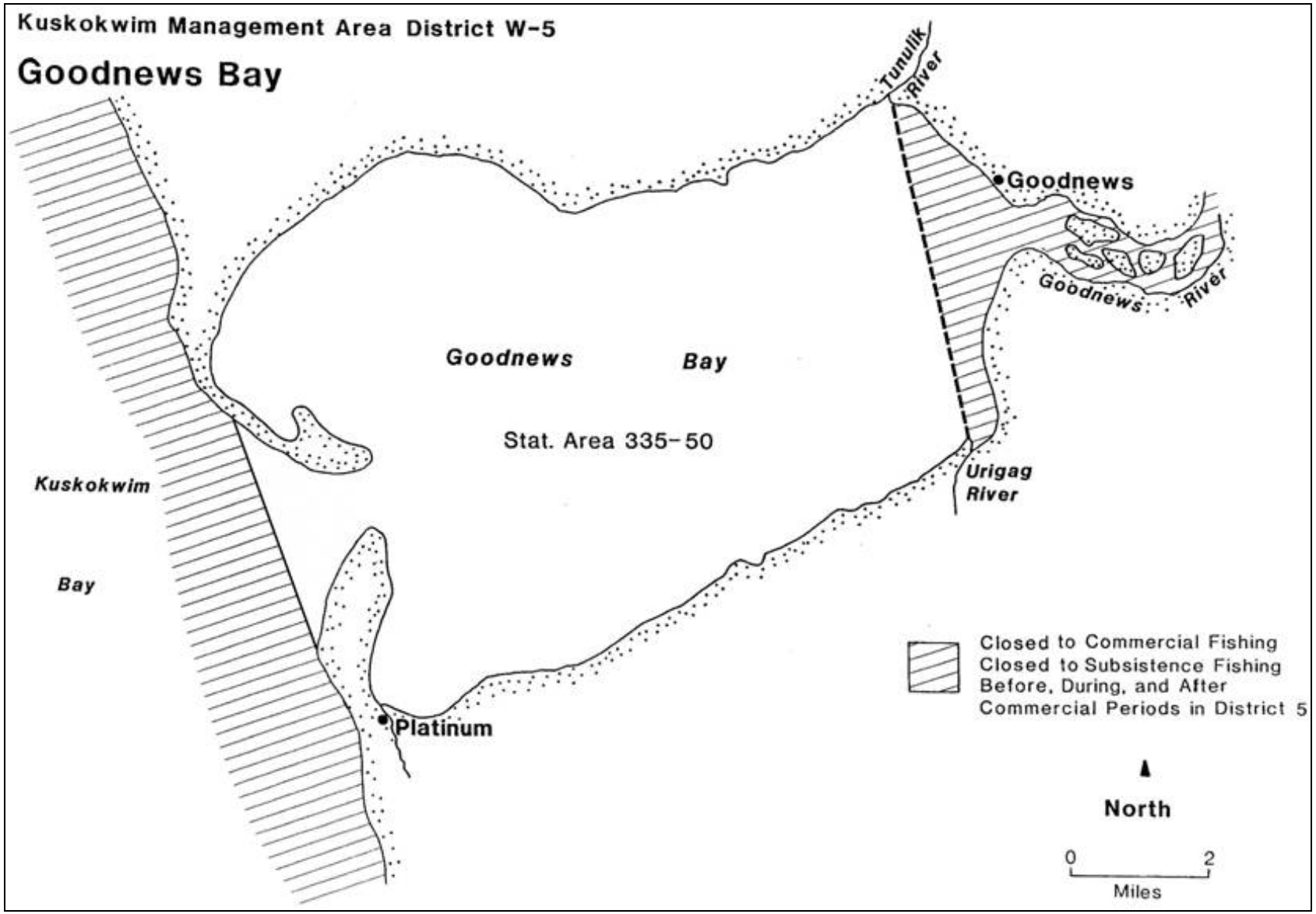


Figure 2.–Commercial fishing District W-5 (Goodnews Bay), Kuskokwim Bay, Alaska, 2007.

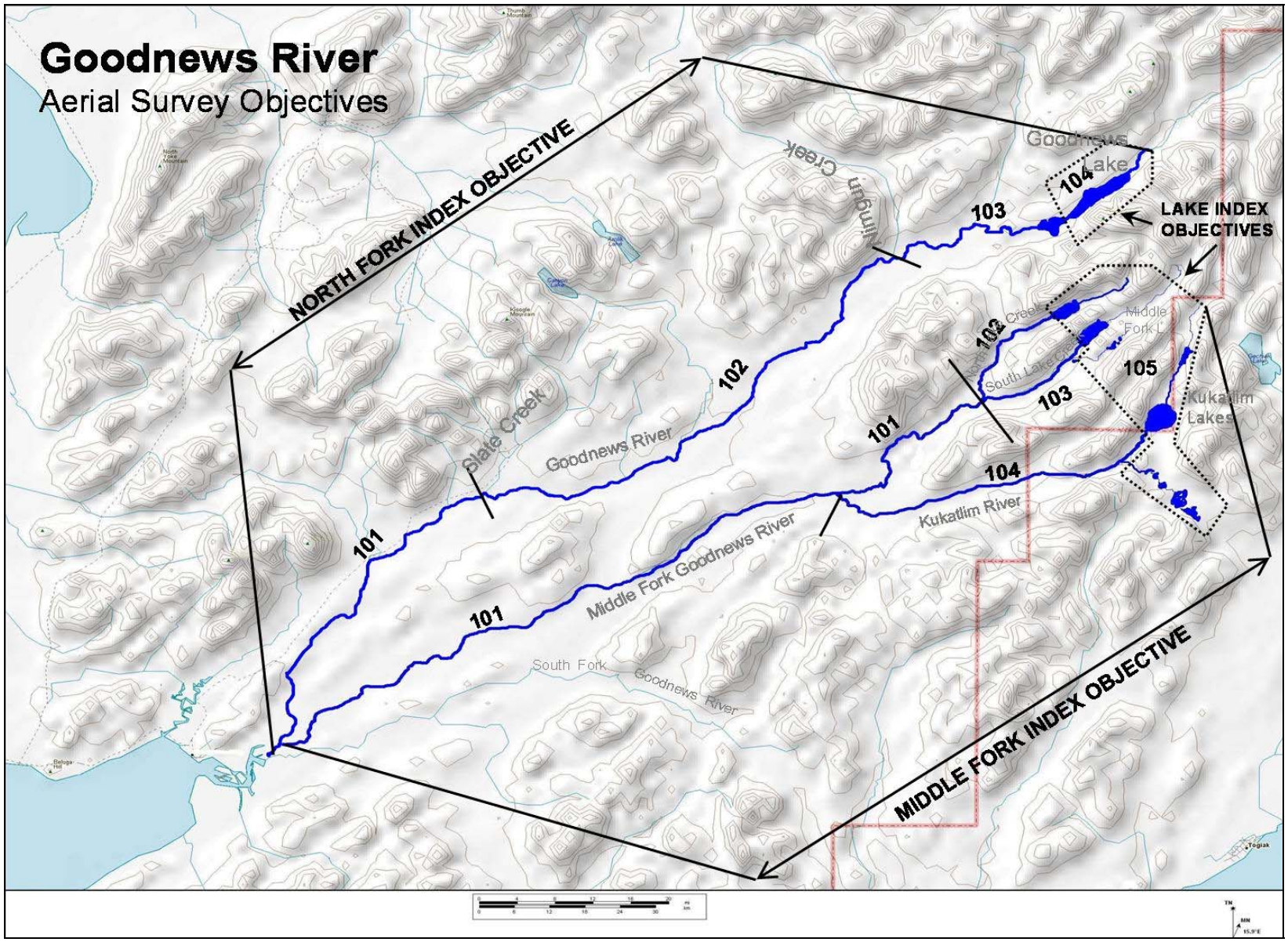


Figure 3.–Map of index areas used for aerial surveys on the Goodnews River drainage.

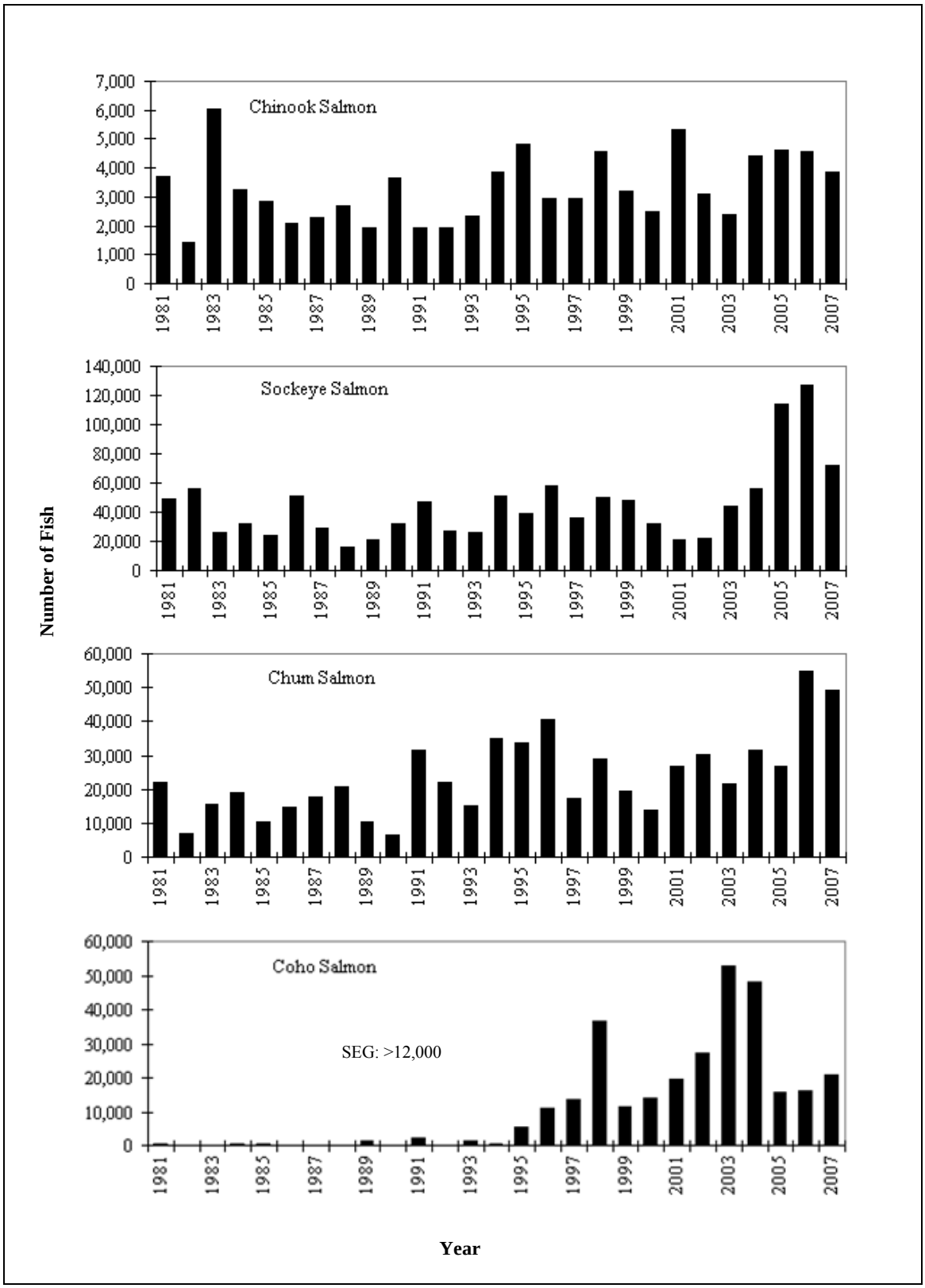


Figure 4.–Historical Chinook, sockeye, chum, and coho salmon escapement estimates, Middle Fork Goodnews River weir, 1981 through 2007.

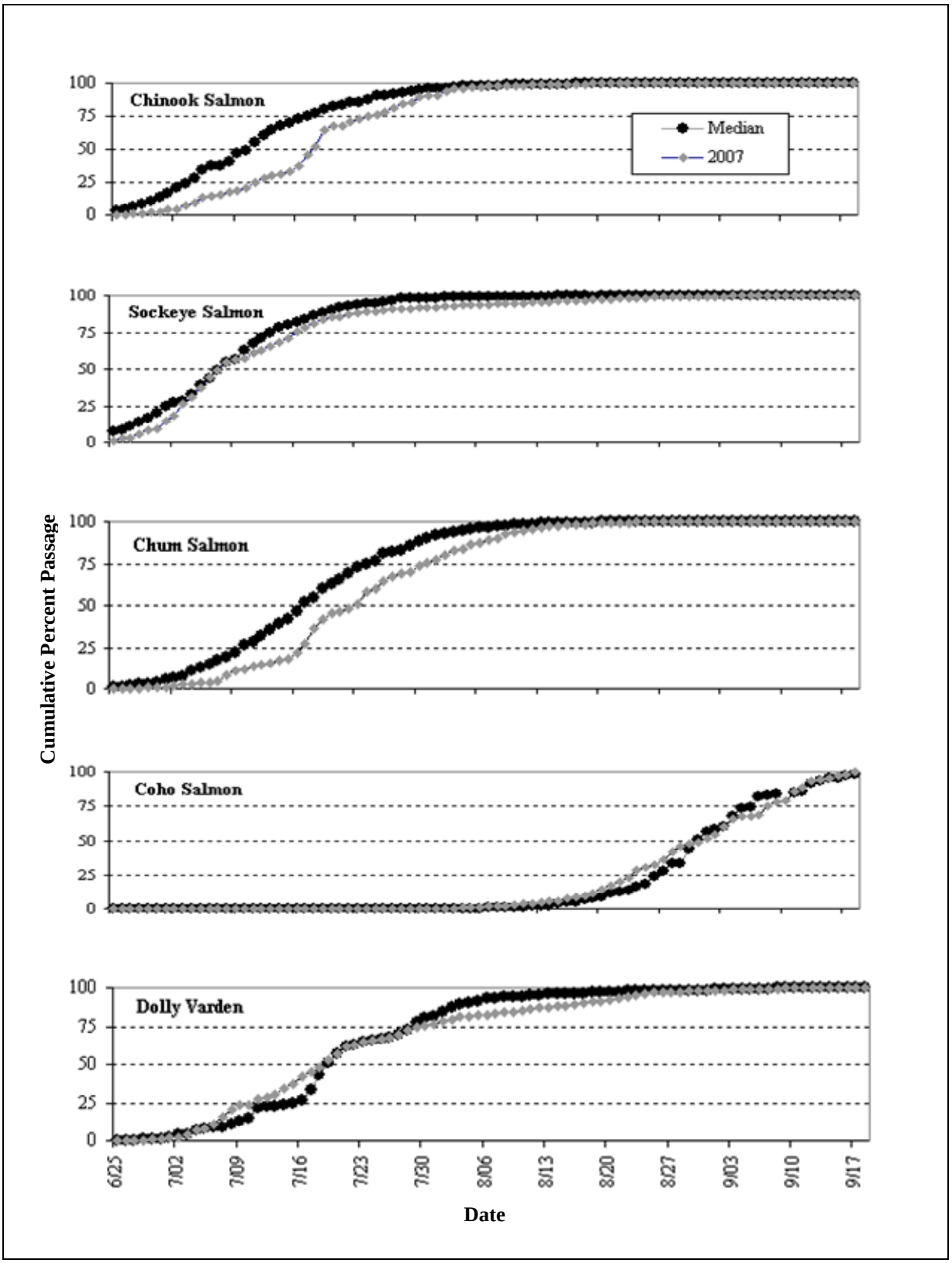


Figure 5.–Cumulative percent passage of Chinook, sockeye, chum, and coho salmon and Dolly Varden, 2007 and historical median, Middle Fork Goodnews River weir.

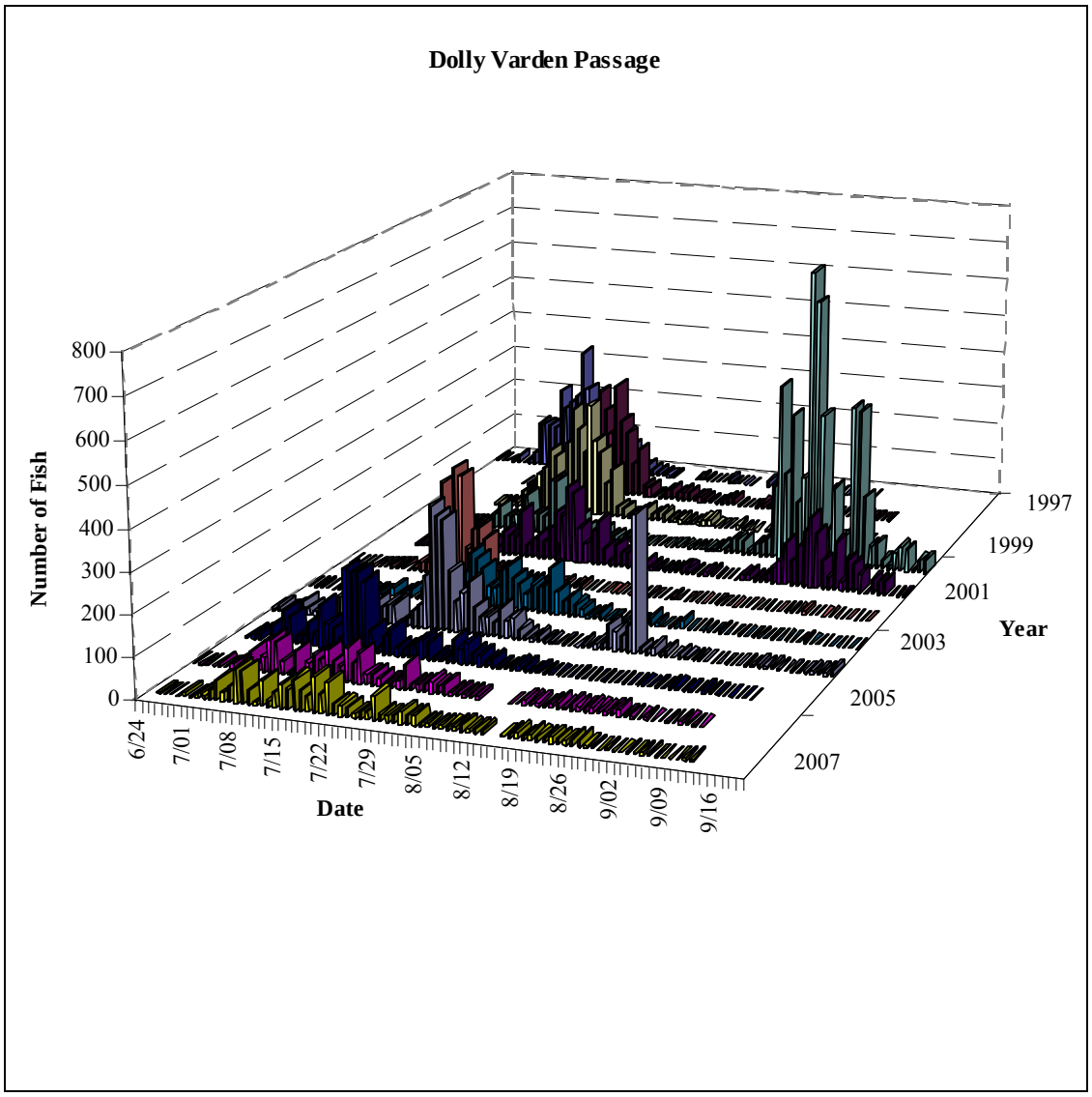


Figure 6.–Historical daily Dolly Varden passage, Middle Fork Goodnews River weir.

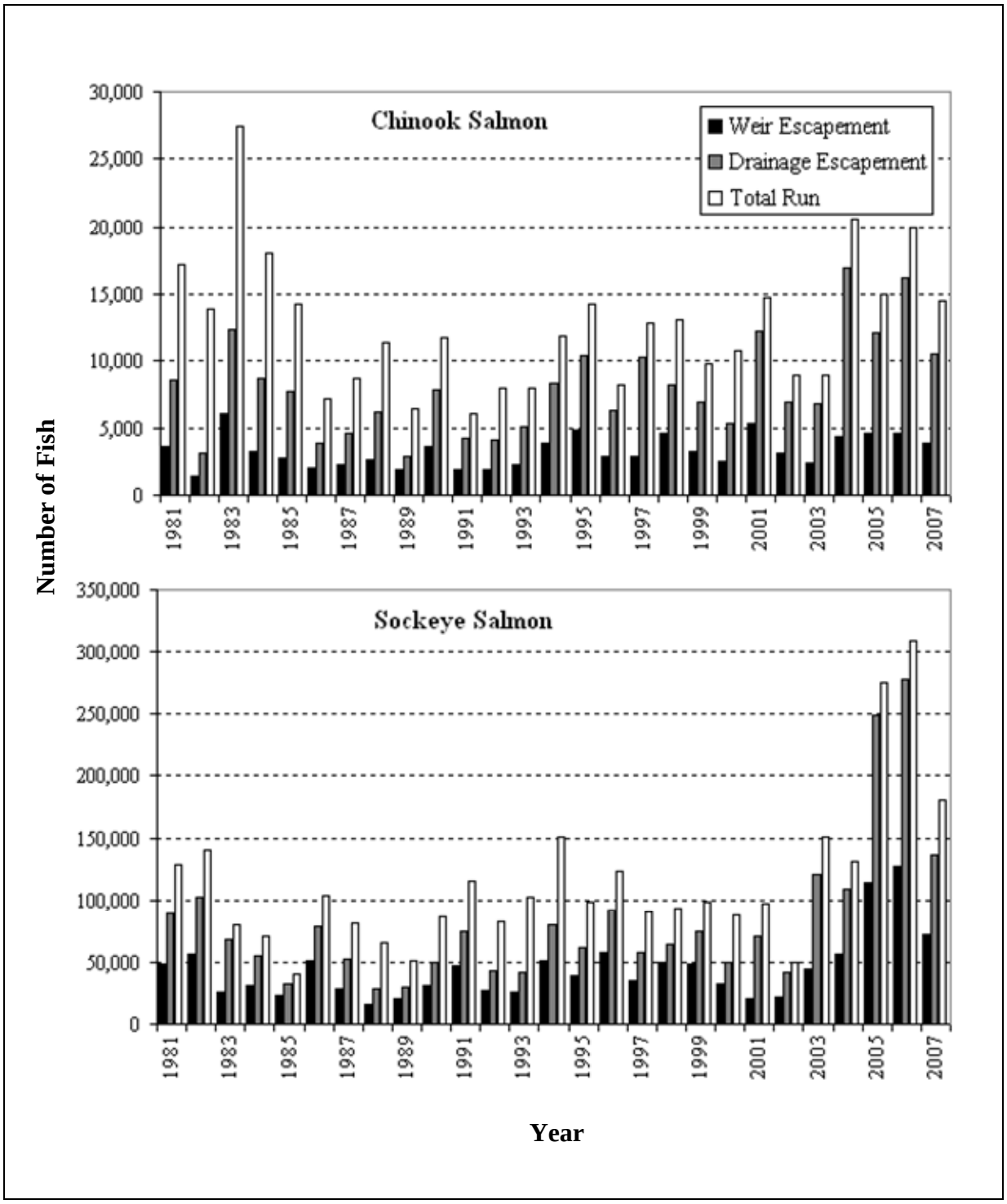


Figure 7.–Historical Chinook and Sockeye salmon escapement estimates and total run, Middle Fork Goodnews River and Goodnews River drainage, 1981–2007.

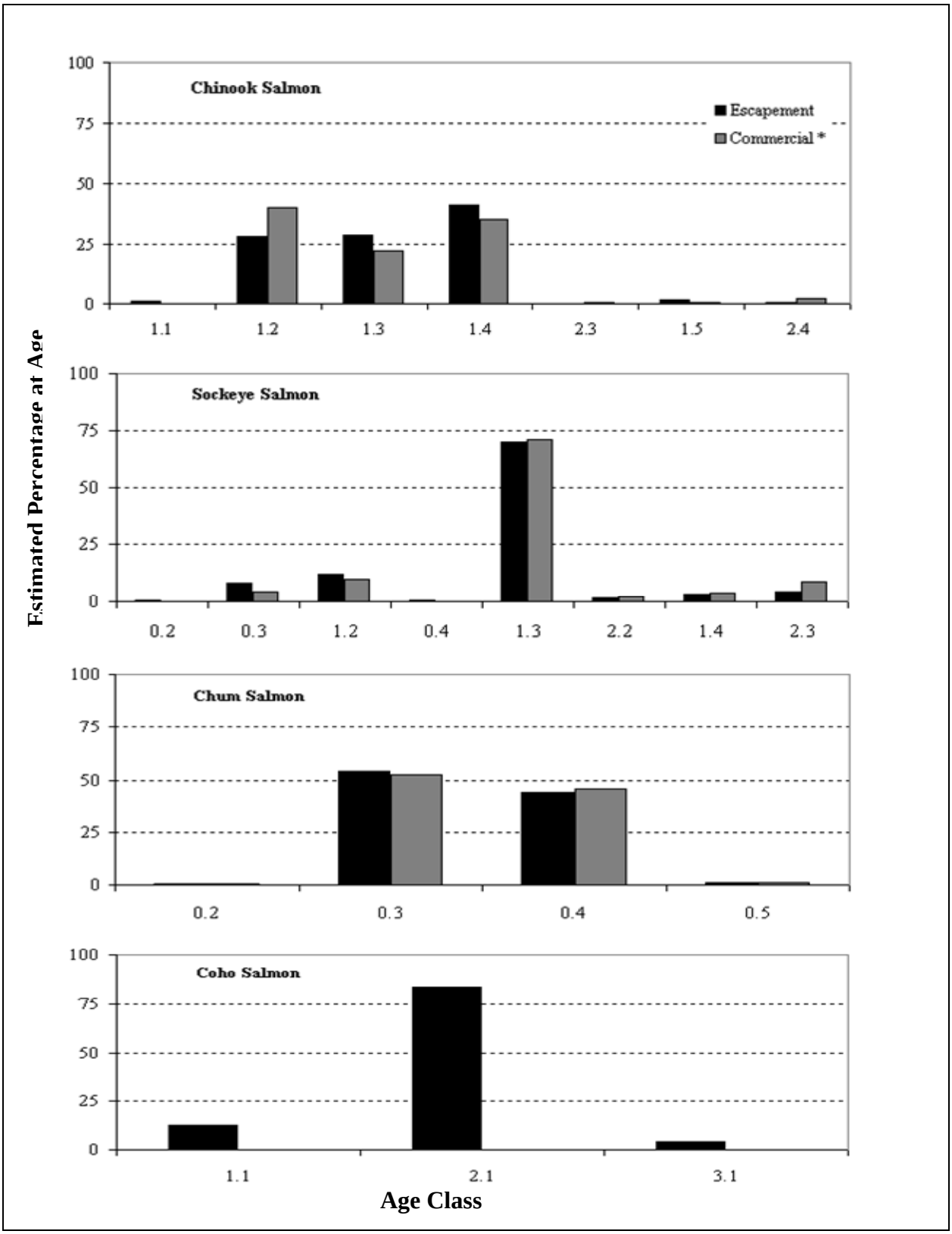


Figure 8.–Estimated age class percentages for Chinook, sockeye, chum and coho salmon from Middle Fork Goodnews River weir escapement and District W-5 commercial harvest, 2007.

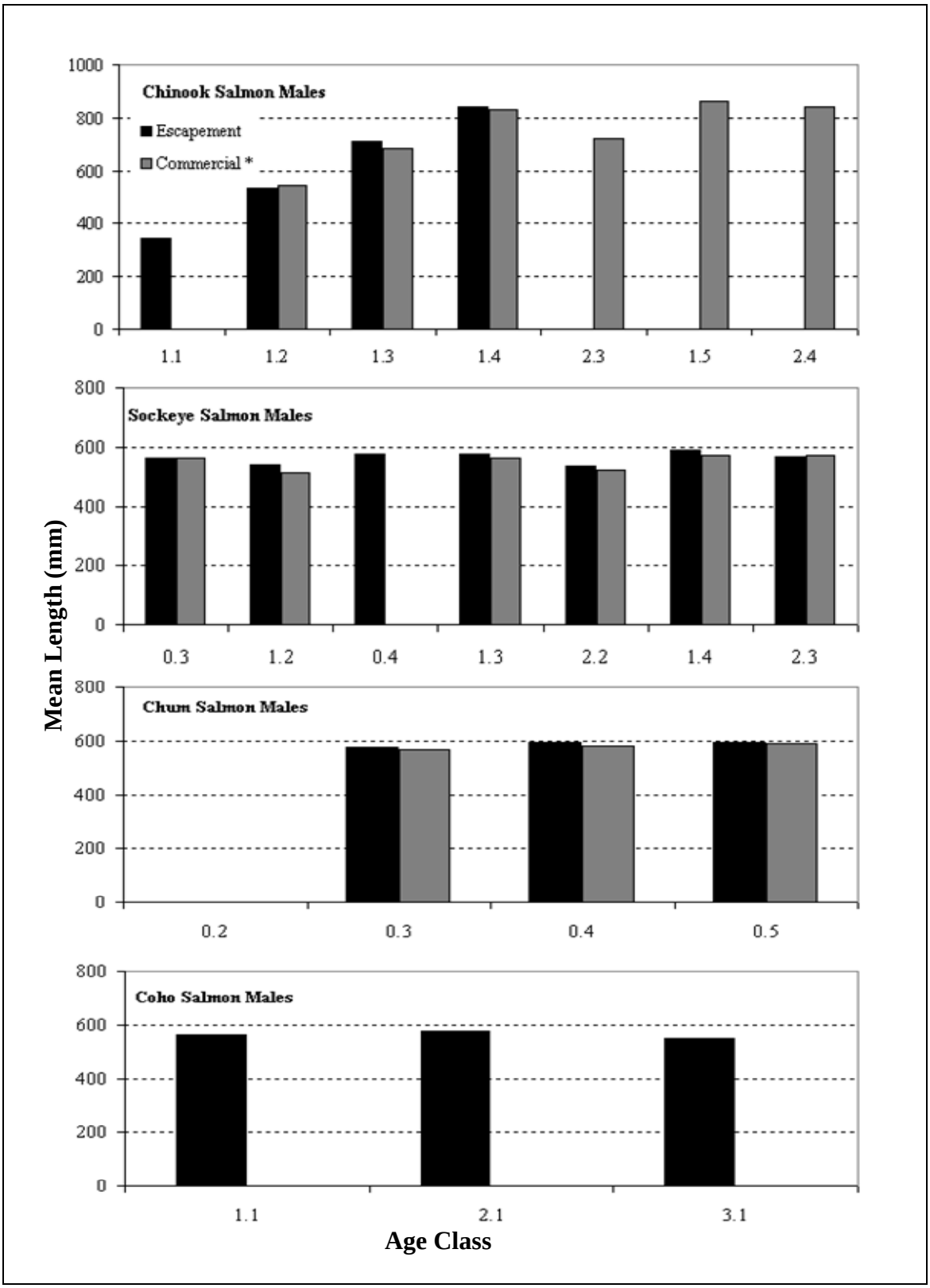
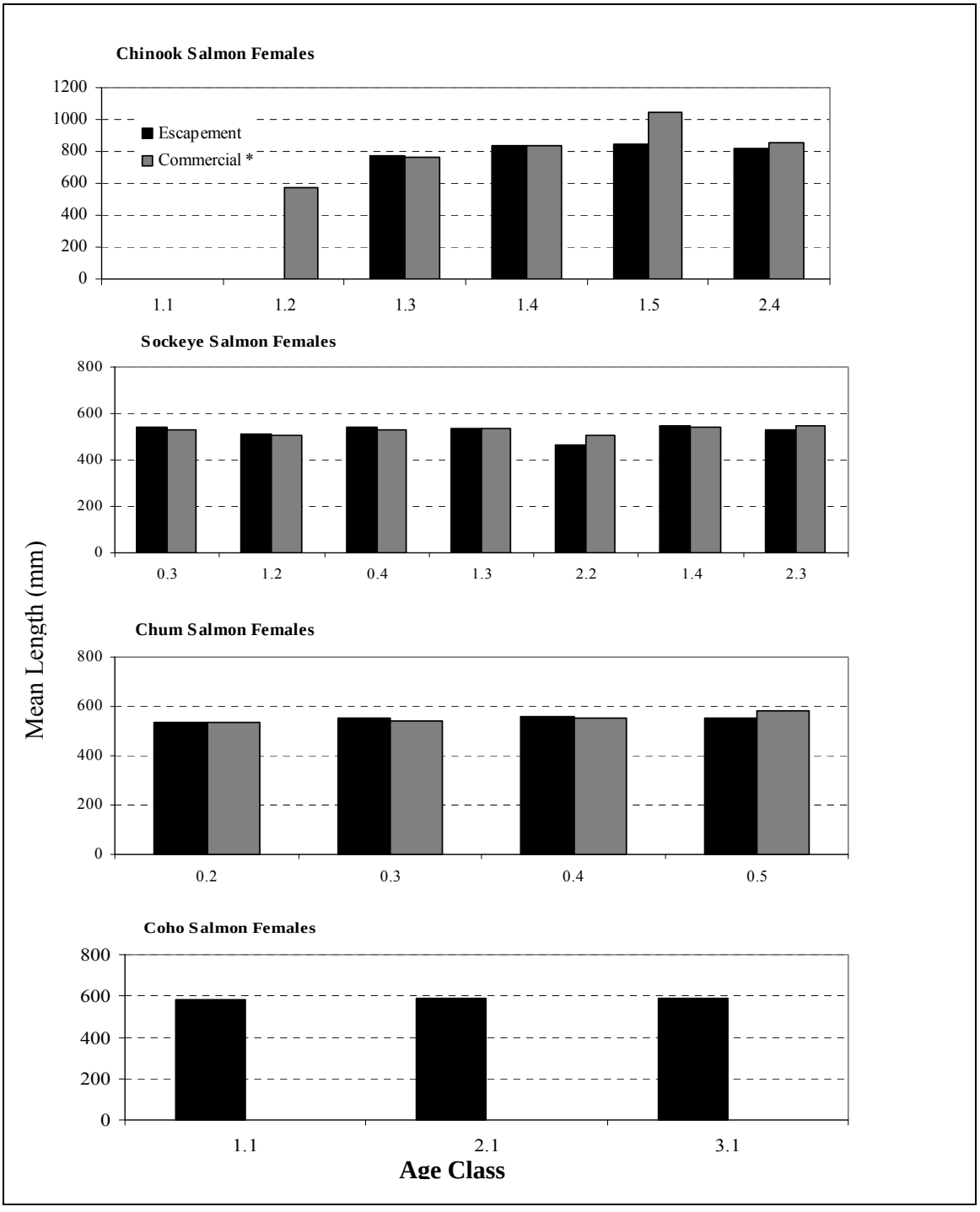


Figure 9.–Mean length by age class for male Chinook, sockeye, chum and coho salmon, Middle Fork Goodnews River weir escapement and District W-5 commercial harvest.



*Mean lengths do not represent total commercial catch as the number of samples collected was inadequate.

Figure 10.–Mean length by age class for female Chinook, sockeye, chum and coho salmon, Middle Fork Goodnews River weir escapement and District W-5 commercial harvest, 2006.

APPENDIX A. SALMON HARVESTS OF GOODNEWS BAY AREA

Appendix A1.–Historical commercial, subsistence, and sport fishing harvest of Chinook, sockeye, coho, and chum salmon, Goodnews Bay area, 1968–2007.

	Chinook			Sockeye			Chum			Coho		
Year	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport
1968										5,458		
1969	3,978			6,256			5,006			11,631		
1970	7,163			7,144			12,346			6,794		
1971	477			330			301			1,771		
1972	264			924			1,331			925		
1973	3,543			2,072			15,781			5,017		
1974	3,302			9,357			8,942			21,340		
1975	2,156			9,098			5,904			17,889		
1976	4,417			5,575			10,354			9,852		
1977	3,336	574[a]		3,723			6,531			13,335		
1978	5,218			5,412			8,590			13,764		
1979	3,204	338		19,581			9,298			42,098		
1980	2,331	690		28,632			11,748			43,256		
1981	7,190	1,409		40,273			13,642			19,749		
1982	9,476	1,236		38,877			13,829			46,683		
1983	14,117	1,066	31	11,716		14	6,766		10	19,660		168
1984	8,612	629		15,474			14,340			71,176		
1985	5,793	426	323	6,698	704	75	4,784	348	124	16,498	221	386
1986	2,723	555		25,112	943	122	10,355	191		19,378	8[b]	
1987	3,357	816		27,758	955	266	20,381	578		29,057	43[b]	
1988	4,964	310		36,368	1,065		33,059	448		30,832	1,162	
1989	2,966	468	68	19,299	861	146	13,622	784	0	31,849	907	224
1990	3,303	539		35,823	1,123		13,194	332		7,804	1,646	
1991	912	917	26	39,838	1,282	63	15,892	149	189	13,312	1,828	297
1992	3,528	374	23	39,194	826	8	18,520	1,006	0	19,875	1,353	138
1993	2,117	708	81	59,293	836	53	10,657	188	156	20,014	1,226	189
1994	2,570	784	163	69,490	770	70	28,477	470	15	47,499	512	170
1995	2,922	883	41	37,351	253	34	19,832	156	0	17,875	305	114
1996	1,375	415	157	30,717	418	87	11,093	219	0	43,836	352	466
1997	2,039	449	86	31,451	609	61	11,729	133	24	2,983	397	855
1998	3,675	718	431	27,161	508	502	14,155	316	50	21,246	331	574
1999	1,888	871	223	22,910	872	561	11,562	281	47	2,474	582	789

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Appendix A1.–Page 2 of 2.

Year	Chinook			Sockeye			Chum			Coho		
	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport
2000	4,442	703	243	37,252	1,205	82	7,450	364	12	15,531	517	795
2001	1,519	895	147	25,654	974	108	3,412	226	21	9,275	616	822
2002	979	857	224	6,304	1,050	149	3,799	407	99	3,041	297	429
2003	1,412	737	10	29,423	783	42	5,593	176	14	12,658	1,319	681
2004	2,565	954	100	20,922	960	0	6,014	257	0	23,690	1,617	622
2005	2,035	868	0	23,933	1,233	0	2,568	209	0	11,735	839	1,046
2006	2,892	676	754	29,857	1,007	523	11,568	648	145	12,436	704	1,742
2007	3112	[c]	[c]	43716	[c]	[c]	7519	[c]	[c]	13689	[c]	[c]
10 Year Average [d]	2,345	773	222	25,487	920	203	7,785	302	41	11,507	722	836
Historical Average[e]	2,532	691	163	32,749	876	146	12,747	356	45	18,314	869	585

Note: Commercial harvest from District W-5, combined subsistence harvest by the communities of Goodnews Bay and Platinum, subsistence harvest estimates prior to 1988 are based on a different formula and are not comparable with estimates from 1988 to present.

[a] Subsistence harvest estimate in 1977 was for Goodnews Bay only.

[b] Subsistence harvest estimates are for the community of Platinum only.

[c] Not available at time of publication.

[d] 10 year average from 1997 through 2006.

[e] Historical average of subsistence harvest from 1988 through 2006.

APPENDIX B. GOODNEWS ESCAPEMENT

Appendix B1.–Historical escapement, Middle Fork Goodnews River escapement projects, 1981–2007.

Year	Method	Dates of Operation	Chinook	Sockeye	Chum	Pink[a]	Coho	Dolly Varden
1981	Counting Tower[b]	6/13 - 8/9	3,688	49,108	21,827	[e]	356 [d]	[e]
1982	Counting Tower[b]	6/23 - 8/3	1,395	56,255	6,767	[e]	91 [d]	[e]
1983	Counting Tower[b]	6/11 - 7/28	6,027	25,816	15,548	[e]	0 [d]	[e]
1984	Counting Tower[b]	6/15 - 7/31	3,260	32,053	19,003	[e]	249 [d]	[e]
1985	Counting Tower[b]	6/27 - 7/31	2,831	24,131	10,367	[e]	282 [d]	[e]
1986	Counting Tower[b]	6/16 - 7/24	2,080	51,069	14,764	[e]	163 [d]	[e]
1987	Counting Tower[b]	6/22 - 7/30	2,272	28,871	17,517	[e]	62 [d]	[e]
1988	Counting Tower[b]	6/23 - 7/30	2,712	15,799	20,799	[e]	6 [d]	[e]
1989	Counting Tower[b]	6/27 - 7/31	1,915	21,186	10,380	[e]	1,212 [d]	[e]
1990	Counting Tower[b]	6/20 - 7/31	3,636	31,679	6,410	[e]	0 [d]	[e]
1991	Fixed Picket Weir[c]	6/29 - 8/23	1,952	47,397	31,644	1,428	1,978 [d]	[e]
1992	Fixed Picket Weir[c]	6/21 - 8/4	1,905	27,268	22,023	22,601	150 [d]	[e]
1993	Fixed Picket Weir[c]	6/23 - 8/18	2,349	26,452	14,952	318	1,451 [d]	[e]
1994	Fixed Picket Weir[c]	6/23 - 8/9	3,856	50,801	34,849	38,705	309 [d]	[e]
1995	Fixed Picket Weir[c]	6/19 - 8/28	4,836	39,009	33,699	330	5,415 [d]	[e]
1996	Fixed Picket Weir[c]	6/19 - 8/23	2,931	58,290	40,450	20,105	10,869 [d]	1,829 [d]
1997	Fixed/R. Board Weir	6/12 - 9/17	2,937	35,530	17,369	940	13,413	2,808
1998	R. Board Weir	7/4 - 9/17	4,584 [d]	49,513 [d]	28,832 [d]	10,376	36,596	2,915
1999	R. Board Weir	6/25 - 9/26	3,221	48,205	19,513	914	11,545	1,761
2000	R. Board Weir	7/2 - 8/27	2,500 [d]	32,341 [d]	13,791 [d]	0	13,907	6,616
2001	R. Board Weir	6/26 - 9/30	5,351	21,024	26,820	5,405	19,626	3,535
2002	R. Board Weir	6/25 - 9/18	3,085	22,101	30,300	0	27,364	1,770
2003	R. Board Weir	6/18 - 9/18	2,389	44,387	21,637	1,921	52,810	1,949
2004	R. Board Weir	6/21 - 9/20	4,388	55,926	31,616	21,633	47,917	3,492
2005	R. Board Weir	6/26 - 9/8	4,633	113,809	26,690	5,926	15,683	2,128
2006	R. Board Weir	6/26 - 9/7	4,559	126,772	54,699	18,432	15,969	1,858
2007	R. Board Weir	6/25 - 9/10	3,852	72,282	49,285	4,819	20,767	1,549
10 year average (1997–2006)			3,765	54,961	27,127	6,555	25,483 [f]	2,883
Historical Average			3,280	43,646	22,779	9,315	10,670 [f]	2,787

[a] Picket spacing of the weir panels allows pink salmon to freely pass through the weir unobserved.

[b] Project located approximately 500 yd upriver from the current weir location.

[c] Species not enumerated during project operations.

[d] No counts or incomplete counts as the project was not operational during a large portion of species migration. These years not included in the historical average.

[e] Fixed picket weir operated in the same location as the current weir.

[f] Average (1997–2005). Coho operations started in 1997.

APPENDIX C. GOODNEWS AERIAL SURVEYS

Appendix C1.–Historical aerial survey counts by species, Goodnews River drainage, 1980–2007.

	North Fork Goodnews River and Lakes				Middle Fork Goodnews River and Lakes			
Year	Chinook	Sockeye	Chum	Coho	Chinook	Sockeye	Chum	Coho
1980	[a]	[a]	[a]	[a]	[a]	18,926	[a]	[a]
1981	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1982	1,990	19,160	9,700	[a]	1,546	[a]	6,300	[a]
1983	2,600	9,650	[a]	[a]	2,500	5,900	[a]	[a]
1984	3,245	9,240	17,250	[a]	1,930	12,897	9,172	[a]
1985	3,535	2,580	4,415	[a]	2,050	7,211	3,593	[a]
1986	1,068	8,960	11,850	[a]	1,249	16,990	7,645	[a]
1987	2,244	19,786	12,103	[a]	2,222	24,505	9,696	[a]
1988	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1989	651	3,605	[a]	[a]	1,277	8,044	2,922	[a]
1990	626	27,689	[a]	[a]	[a]	[a]	[a]	[a]
1991	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1992	[a]	10,397	[a]	[a]	[a]	[a]	[a]	[a]
1993	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1994	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1995	3,314	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1996	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1997	3,611	12,610	[a]	[a]	1,447	19,843	[a]	[a]
1998	578	3,497	2,743	[a]	731	11,632	3,619	[a]
1999	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2000	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2001	3,561	29,340	7,330	[a]	2,799	12,383	6,945	[a]
2002	1,470	[a]	3,075	[a]	1,195	[a]	1,208	[a]
2003	3,935	50,140	[a]	[a]	2,131	29,150	[a]	[a]
2004	7,462	31,695	[a]	[a]	2,617	33,670	[a]	[a]
2005	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2006	4,159	78,100	[a]	[a]	[a]	[a]	[a]	[a]
2007	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
SEG	640 – 3,300	5,500 – 19,500	[b]	[b]	[b]	[b]	[b]	[b]
10 Year Average [c]	2,937	27,453	8,558		1,772	18,159	5,678	

[a] Survey was either not flown or not rated as acceptable.

[b] Aerial survey SEG was discontinued in 2004.

[c] Most Recent 10 year average from years with acceptable data..

APPENDIX D. GOODNEWS TOTAL RUN AND EXPLOITATION

Appendix D1.–Historical Chinook salmon total run estimates and exploitation rates, Goodnews River drainage, 1981–2007.

	Escapement		Harvest				
Year	Middle Fork	North Fork [a]	Commercial	Subsistence	Sport	Total Run	Annual Exploitation
1981	3,688	4,859 [b]	7,190	1,409		17,146	0.50
1982	1,395	1,796	9,476	1,236		13,903	0.77
1983	6,027	6,268	14,117	1,066	31	27,509	0.55
1984	3,260	5,481	8,612	629		17,982	0.51
1985	2,831	4,882	5,793	426	323	14,255	0.46
1986	2,080	1,779	2,723	555		7,137	0.46
1987	2,272	2,294	3,357	816		8,739	0.48
1988	2,712	3,423	4,964	310		11,409	0.46
1989	1,915	976	2,966	468	68	6,393	0.55
1990	3,636	4,204	3,303	539		11,682	0.33
1991	1,952	2,257	912	917	26	6,063	0.31
1992	1,905	2,202	3,528	374	23	8,033	0.49
1993	2,349	2,716	2,117	708	81	7,970	0.36
1994	3,856	4,458	2,570	784	163	11,831	0.30
1995	4,836	5,591	2,922	883	41	14,272	0.27
1996	2,931	3,389	1,375	415	157	8,266	0.24
1997	2,937	7,329	2,039	449	86	12,840	0.20
1998	4,584	3,625	3,675	718	431	13,032	0.37
1999	3,221	3,647	1,888	871	223	9,850	0.30
2000	2,500	2,831	4,442	703	243	10,719	0.50
2001	5,351	6,808	1,519	895	147	14,720	0.17
2002	3,085	3,795	979	857	224	8,939	0.23
2003	2,389	4,411	1,412	737	10	8,959	0.24
2004	4,388	12,512	2,565	954	100	20,520	0.18
2005	4,633	7,405	2,035	868	0	14,941	0.19
2006	4,559	11,704 [c]	2,892	676	79	19,910	0.18
2007	3,852	6,650	3,112	733 [d]	154 [d]	14,500	0.28
						Average	0.37
						20 year	0.31
						15 year	0.27
						10 year	0.27
						5 year	0.21

[a] North Fork estimate calculated using aerial survey proportions from concurrent years or most recent 5 year averages when aerial surveys were not flown or were incomplete.

[b] North Fork estimate calculated using 5 year average from aerial survey proportions from 1982–1986.

[c] North Fork estimate calculated using partial aerial survey proportions from 2006.

[d] 10 year average (1995–2006).

Appendix D2.–Historical sockeye salmon total run estimates and exploitation rates, Goodnews River drainage, 1981–2007.

	Escapement		Harvest				
Year	Middle Fork	North Fork [a]	Commercial	Subsistence	Sport	Total Run	Annual Exploitation
1981	49,108	39,724 [b]	40,273			129,105	0.31
1982	56,255	45,506 [b]	38,877			140,638	0.28
1983	25,816	42,224	11,716		14	79,770	0.15
1984	32,053	22,964	15,474			70,491	0.22
1985	24,131	8,634	6,698	704	75	40,242	0.19
1986	51,069	26,932	25,112	943	122	104,178	0.25
1987	28,871	23,311	27,758	955	266	81,161	0.36
1988	15,799	12,780	36,368	1,065		66,012	0.57
1989	21,186	9,495	19,299	861	146	50,986	0.40
1990	31,679	18,103	35,823	1,123		86,728	0.43
1991	47,397	27,085	39,838	1,282	63	115,665	0.36
1992	27,268	15,582	39,194	826	8	82,878	0.48
1993	26,452	15,116	59,293	836	53	101,749	0.59
1994	50,801	29,030	69,490	770	70	150,161	0.47
1995	39,009	22,291	37,351	253	34	98,938	0.38
1996	58,290	33,309	30,717	418	87	122,822	0.25
1997	35,530	22,579	31,451	609	61	90,230	0.36
1998	49,513	14,885	27,161	508	502	92,570	0.30
1999	48,205	26,214	22,910	872	561	98,762	0.25
2000	32,341	17,587	37,252	1,205	82	88,467	0.44
2001	21,024	49,814	25,654	974	108	97,574	0.27
2002	22,101	20,161	6,304	1,050	149	49,765	0.15
2003	44,387	76,349	29,423	783	42	150,984	0.20
2004	55,926	52,646	20,922	960	0	130,454	0.17
2005	113,809	135,820	23,933	1,233	0	274,795	0.09
2006	126,772	151,290	29,857	1,006	98	309,024	0.10
2007	72,282	63,782	43,716	823 [c]	144 [c]	180,747	0.25
						Average	0.31
						20 year	0.33
						15 year	0.30
						10 year	0.23
						5 year	0.16

[a] North Fork estimate calculated using aerial survey proportions from concurrent years or most recent 5 year averages when aerial surveys were not flown or were incomplete.

[b] North Fork estimate calculated using 5 year average from aerial survey proportions from 1982–1986.

[c] North Fork estimate calculated using partial aerial survey proportions from 2006.